J.D. Irving Ltd. – Fundy License #7

Forest Management Plan

2002-2026

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THE FUNDY LICENSE (#7)

2002 – 2026 MANAGEMENT PLAN

Prepared by: J. D. IRVING, LIMITED

Submitted for review and approval to the New Brunswick Department of Natural Resources and Energy as specified in the document "A Vision for New Brunswick Forests . . . Goals and Objectives for Crown Land Management" as required under the New Brunswick Crown Lands and Forests Act.

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The Fundy License (#7)
2002-2026 Management Plan
January, 2002

EXECUTIVE SUMMARY

As specified and required by the New Brunswick Department of Natural Resources and Energy (DNRE); J. D. Irving, Limited (JDI) has prepared a 2002-2026 Management Plan for the Fundy License (#7). This Management Plan meets the philosophy, principles and objectives of the DNRE as noted in the March 10, 2000 document: "**A Vision for New Brunswick's Forests...Goals and Objectives for Crown Land Management**". The plan has been developed through detailed discussions with DNRE and JDI staff. We believe the proposed strategy and management plan is ecologically sustainable, economically viable and socially responsible; while achieving DNRE's goals and objectives for Crown land management in New Brunswick.

This Fundy License Management Plan is based upon an updated forest inventory, new ground plot data and improved growth and yield information. Operational and technological advances in forestry practices have also been incorporated into the strategy. A thorough analysis of impacts and benefits of different objectives and alternative strategies has been undertaken using the "Woodstock®" wood supply model and other forecasting tools.

For the new 2002 management-planning period, DNRE has introduced several significant new objectives. These include:

- eco-region-based forest community objectives,
- additional habitat objectives,
- aesthetic buffer zones along public highways, and
- establishment of several large proposed "Protected Areas" on Crown land.

Improved stratification, new photo interpretation for part of the land base, and a greatly expanded network of ground plot information; has provided a foundation and basis for the development of new growth and yield curves for the Fundy License. A result of these improvements has been higher average yields and an increased growing stock on the License compared to the previous 1997 plan.

A reduced reliance upon clear-cut harvesting; and more use of shelterwood, commercial thinning and uneven-aged management prescriptions is another significant change to the strategy proposed in our 2002 Management Plan.

Our Management Plan is able to achieve the vast majority of the new eco-region based forest community objectives desired by DNRE; however, due to the present levels of several specific forest communities on the License, the targets could not be totally achieved.

Those specific eco-region level objectives that could not be met in each and every 5-year period include:

- the "OSFH" block objective of 2,320 hectares for Eco-region 3
- the "OSFH" block objective of 6,960 hectares for Eco-region 6
- the "THSW objective of 450 hectares for Eco-region 4
- the "THSW objective of 1,740 hectares for Eco-region 6
- the "THSW objective of 1,350 hectares for Eco-region 7

We do not consider the "shortfalls" to be serious issues because these habitats simply are not present on the License at this time under the present broad forest stratification. We will however; identify, maintain, and designate up to the necessary area of THSW stands meeting the criteria that we encounter in our operations.

In order to achieve the Crown land management objectives established by DNRE, we divided the Fundy License into six spatially distinct and discrete zones. Listed in order of prioritization, these include:

- Proposed "Protected Areas",
- Unique Areas, Sugar Leases and Reserves,
- Deer Wintering Area Management Units,
- "Old Spruce/Fir Habitat" blocks,
- Watercourse and Highway Buffers, and
- the "General Forest Zone".

The five zones where timber is not the primary management objective comprise approximately 32% of the Fundy License area.

The proposed spruce/fir/jack pine harvest level of 348,300 m^3/yr from the total Fundy License is 2% above the 1997 Management Plan level. Our analysis indicates that by year 2050, it will be possible to further increase the spruce/fir/Jack Pine harvest by 20% to 410,000 m^3/yr. With a commitment by DNRE to permit additional tree planting however, the AAC for the Fundy License could be doubled by 2040.

The proposed hardwood harvest level of 208,600 m^3/yr is 25% greater than the previous plan. This is however, an accelerated hardwood harvest level, proposed for silvicultural reasons. We plan to reduce the hardwood harvest to a long term sustainable level of 175,000 m^3/yr at year 2017.

The projected White Pine saw log harvest level of 11,100 m^3/yr is 2% less than the 1997 plan and 33% less than the present allocation level. This shortfall in White Pine allocation from the Fundy License needs to be addressed by DNRE. We have incorporated a relatively intensive white pine management strategy into this plan for the Fundy License Plan, with an objective of maximizing the allowable harvest level.

The expected "fallout" volume of cedar saw material in this new Management Plan (4,400 m^3/yr) is a reduction of 24% compared to the 1997 Plan and present allocation levels. It

must also be noted that this fallout volume is well above the estimated long term sustainable cedar saw material yield of 2,500 m^3/yr. Cedar resource use must be reviewed and rationalized by DNRE.

The proposed AAC levels by species group and forest zone is summarized in Table i.

Table i. Harvest levels on the Fundy License for the 2002-2006 management plan period (after all operational net-downs).

Forest Zone	Harvest Levels (m^3/year)				
	Spruce/Fir/Jack Pine m^3/yr	Hardwood m^3/yr	White Pine Sawlogs m^3/yr	Cedar Saw Material m^3/yr	Total m^3/yr
General Forest	329,000	199,000	10,200	4,100	542,300
Protected Areas[1]	3,300	1,900	100	100	5,400
Unique Areas	400	100	100	0	600
DWAMUs[1]	3,200	3,000	200	0	6,400
OLDSF Blocks	5,000	3,000	200	100	8,300
Watercourse Buffers	7,400	1,600	300	100	9,400
Total License	348,300	208,600	11,100	4,400	572,400

[1] Volume level is for 5-years only (2002-2006)

Our proposal also outlines a tree planting and pre-commercial thinning program of 3,474 hectares, which is reduced approximately 11% from the 1997 Management Plan levels. The silviculture levels proposed (by forest zone) in our strategy are summarized in the following table (Table ii).

Table ii. Silvicultural levels on the Fundy License for the 2002-2026 management plan period.

Forest Zone	Proposed Silviculture Level (hectares/year)				
	Planting	Pre-commercial Thinning			Pct Total
		Softwood	Mixedwood	Hardwood	
General Forest	1,422	1,143	470	302	1,915
Protected Areas	0	0	0	0	0
Unique Areas	0	0	0	0	0
DWAMUs	10	82	5	5	92
OLDSF Habitat Blocks	15	20	0	0	20
Watercourse Buffers	0	0	0	0	0
Total License	1,447	1,245	475	307	2,027

A brief comparison of total harvest and silviculture levels for previous Management Plans and our proposal for the Fundy License is summarized in the following table:

Table iii. Comparison of 1993, 1997 and proposed 2002 Fundy License management plan harvesting and silviculture levels.

Management Plan	Harvest Levels (m3/yr)				Silviculture Program (ha/yr)		
	Spruce/Fir /Jack Pine	Hard-wood	White Pine Sawlogs	Cedar High grade Products	Planting	Pre-commercial Thinning	Total
1993	285,000	116,000	20,250	4,000	1,100	1,280	2,380
1997	340,500	167,300	11,300	5,800	1,135	3,015	4,150
2002	348,300	208,600	11,100	4,400	1,447	2,027	3,474

In preparing for and developing this 2002-2026 Management Plan for the Fundy License many important issues and concerns have been reviewed and discussed. As a result, we have made several serious recommendations to further improve future management processes, procedures and results. Our recommendations are as follows:

- We recommend that DNRE consider recognizing commercial thinning prescription costs, and silvicultural benefits; by providing a per hectare silvicultural reimbursement, or by providing a reduced royalty for commercial thinning.

- We recommend that DNRE ensure they are committed to provide funding for the total silviculture program prescribed in this Management Plan, including providing sufficient seedlings, and providing funding and approval to maintain all (past and present) planted areas free to grow.

- We recommend that DNRE mitigate the loss to the working forest caused through the establishment of 41,270 hectares of "Protected Areas" on the Fundy License; by incorporating unallocated adjacent Crown lands into the Fundy License.

- We recommend that DNRE review the status of the unallocated Crown forestland in the province, and as required under the Crown Lands and Forest Act, incorporate these areas into the adjacent Crown Licenses.

- We recommend that DNRE staff review and revise the definition of, criteria for, and management objectives related to "moderate winter deer habitat" within DWAMUs.

- We recommend that DNRE staff, in consultation with Licensees, develop alternative streamlined management plan requirements for very small (less than 100 hectares in size) DWAMUs.

- We recommend that DNRE staff, in consultation with Licensees, review and revise the OSFH block criteria and objectives, well in advance of preparation of the 2007

Management Plans.

- We recommend that DNRE review the updated forest inventory and establish more realistic and achievable forest community level objectives for the Fundy License.

- We recommend that all levels of DNRE (Branch, Region and District) have the opportunity to review and comment on this Management Plan, prior to its approval by DNRE senior management.

- We recommend that the government of New Brunswick adopt a policy that "All land use decisions and Crown land Management objectives must not further compromise the present or long term harvest level from New Brunswick's Crown land."

- We recommend that the government of New Brunswick establish Crown License Management objectives and related performance criteria focussed on doubling the sustainable harvest by 2040.

Over the past two years we have submitted evolving drafts of our proposed 2002-2026 management strategy and plans for the Fundy License to DNRE for review. We have considered the comments received and have revised our strategy and proposed management plan accordingly.

We believe that this blocked 25-year Management Plan for the Fundy License meets the New Brunswick Department of Natural Resources and Energy's goals and objectives for Crown land management. We are confident that we can implement this strategy on the ground consistent with DNRE's present policies and procedures. We are proud of this Management Plan and we feel that it is environmentally, economically, and socially responsible.

J. D. Irving, Limited
January 21, 2002

INTRODUCTION

It is required under the New Brunswick Crown Lands and Forests Act, that each Licensee develop and revise a 25-year Management Plan for the License they manage. The first Management Plans were prepared in 1982, and have been revised every five years since.

This document is J. D. Irving, Limited (JDI) 2002-2026 Management Plan for the Fundy License (License #7). This plan outlines a strategy for management of the Fundy License in order to meet the philosophy, principles, and objectives of the New Brunswick Department of Natural Resources and Energy (DNRE) as noted in the March 10, 2000 document: "A Vision for New Brunswick's Forests . . . Goals and Objectives for Crown Land Management" (Appendix I).

This plan has been developed through detailed discussions with DNRE and JDI staff, along with input from other stakeholders. This management plan outlines a strategy that is ecologically sustainable, economically viable and socially responsible; while achieving DNRE's goals and objectives for Crown land management in New Brunswick.

The 2002-2026 Management Plan for the Fundy License is based upon an updated forest inventory, and new ground plot data to improve growth and yield information. Operational and technological advances in forestry practices have also been incorporated into the management strategy proposal. A thorough analysis of impacts and benefits of the different objectives and potential strategies has been undertaken using the "Woodstock®" wood supply model and other forecasting tools, in order to develop this proposal.

For the new 2002 management-planning period, DNRE has introduced several significant new objectives. These include:

- eco-region-based forest community objectives,
- additional habitat objectives,
- aesthetic buffer zones along public highways, and
- establishment of several large proposed "Protected Areas" on Crown land.

Each of these newly introduced objectives further constrains and has the potential to reduce the Annual Allowable Cut (AAC) from the License, compared to previous Management Plans.

Improved stratification, new photo interpretation for part of the land base, and a greatly expanded network of ground plot information; has provided a foundation and basis for the development of new growth and yield curves for the Fundy License. A result of these improvements has been higher forecast yields and an increased growing stock for spruce, and most hardwood species on the License, compared to the previous 1997 plan.

A reduced reliance upon clear-cut harvesting; and higher utilization of shelterwood, commercial thinning and uneven-aged management prescriptions is another significant change to the strategy proposed for the 2002 Management Plan period. The change in strategy is due in part to:

- improved health and vigor of the forest,
- better markets for low grade hardwood products,
- maturing silviculture treatments (planting and thinnings),
- a greater proportion of the land base in non-timber primary management zones, and
- an improved level of ecological sophistication in our management prescriptions.

Even within our clear-cut harvest prescriptions, we are placing a greater emphasis on the importance of maintaining sufficient structural and biological diversity.

A brief Glossary of terms utilized in this Management Plan, has been prepared, and is included as Appendix II. For more thorough and detailed definitions we would suggest referring to documents such as Natural Resources Canada's "Silvicultural Terms in Canada."

Our 2002-2026 Management Plan outlines a strategy that increases the spruce/fir/Jack Pine AAC 2% above 1997 levels and provides a significantly increased (+25%) hardwood AAC for the Fundy License. There is however, a reduced White Pine saw log (-2%) and Cedar Saw material (-24%) availability. It should also be noted that the cedar fallout forecast for the next 5 years is not sustainable in the long term.

This plan requires a decreased silviculture level (planting, pre-commercial thinning) compared to the 1997 plan (-11%).

In summary, we believe that 25-year Management Plan for the Fundy License is an ecologically sustainable, economically viable, and socially responsible strategy; that meets the New Brunswick Department of Natural Resources and Energy's goals and objectives for Crown land management.

BACKGROUND INFORMATION AND PLANNING IMPROVEMENTS

In 1982 J. D. Irving, Limited was assigned management responsibility for the Fundy Crown Land License (License #7). As a Licensee, the company is required to develop and implement a 25-year Management Plan for the land base that achieves the goals and objectives spelt out by the New Brunswick Department of Natural Resources and Energy (DNRE).

This 2002 Management Plan for the Fundy License is the fifth Management Plan for the land base prepared by J. D. Irving, Limited. A major objective of these plans is to provide a strategy to maximize both the short and long-term wood supply from the License, while achieving many specific non-timber goals for the land base. The Fundy License has been a dependable source of sustained timber allocations for 38 mills in New Brunswick, which employs more than 3,000 people.

The March 10, 2000 document: "A Vision for New Brunswick Forests . . . Goals and Objectives for Crown Land Management"; outlined the requirements for development and implementation of the 2002 Management Plans. According to the "Vision" document, DNRE has policy goals with respect to:

- public values;
- forest ecosystem maintenance;
- wildlife habitat;
- timber;
- water and aquatic habitat; and
- recreation and aesthetics.

Specific strategies, actions, objectives and standards have been outlined in order to achieve these policy goals. We believe the strategy put forward in this plan meets DNRE's goals and objectives for Crown land management.

The 2002-2026 Fundy License Management Plan represents a significant improvement over previous plans. By employing new and more accurate information, combined with a broader array of treatment alternatives, and new ecologically based objectives, we believe that we have outlined a management strategy that responsibly balances ecological, economic and social goals and objectives.

Some specific improvements in the 2002 Management Plan include:

- Inclusion of specific biodiversity objectives from an ecological land classification perspective, establishing vegetative community objectives by eco-region.
- A new forest inventory based upon 1993 and 1994 aerial photography for the St. George and Sussex areas has been incorporated.

- An expanded network of Forest Development Survey (FDS) plots which provides a basis for species volume estimates, has been collected between 1996 and 1999.
- An improved, ecologically-based forest stratification process has been implemented.
- A finer resolution of habitat management with respect to old spruce-fir habitat, and old or large succession stages.
- Aesthetic buffer requirements along public highways.
- Utilization of a wider array, and more ecologically appropriate treatment alternatives including uneven-aged management, multiple entry harvesting, commercial thinning and modified clear-cutting prescriptions.

The 2002 Management Plan has been prepared by J. D. Irving, Limited foresters with significant input and consultation from DNRE regional and technical staff. Concerns from other important stakeholders including sub-licensees, recreational users, community interest groups and the general public have influenced the strategy proposed in this Management Plan. Our strategies and objectives have been developed with consideration and sensitivity for public goals and values.

Approved Management Plans provide the basis for annual "Operating Plans", which are prepared for the License each year. These annual plans are also submitted to DNRE for review and approval. Upon completion of each 5-year management planning period, a performance evaluation, based upon pre-established and mutually agreed to criteria; is undertaken by DNRE, in order to assess operational performance, and the success at achieving the forest management objectives for the License.

The 2002-2026 Management Plan for the Fundy License provides for all the objectives outlined in the DNRE "Vision" document. A summary comparison of the harvest and silviculture levels with previous Management Plans for the Fundy License is provided in Table 1.

Table 1. Comparison of 1993, 1997 and 2002 Fundy License management plan harvesting and silviculture levels.

Management Plan	Harvest Levels (m3/yr)				Silviculture Program (ha/yr)	
	Spruce/Fir /Jack Pine	Hardwood	White Pine Sawlogs	Cedar Highgrade Products	Planting	Pre-commercial Thinning
1993	285,000	116,000	20,250	4,000	1,100	1,280
1997	340,500	167,300	11,300	5,800	1,175	2,745
2002	348,300	208,600	11,100	4,400	1,447	2,027

PUBLIC CONSULTATION AND INPUT

J. D. Irving, Limited has worked actively to solicit public input regarding our forest management, and to improve public consultation processes for many years. This summary is not meant to be an exhaustive analysis of our public consultation efforts, however it outlines some of our more recent efforts. We have utilized numerous vehicles and initiatives in this regard including:

- Participation in, and sponsorship of multi-stakeholder Advisory Committees and processes,
- Public outreach initiatives including open houses, hosting field tours, making presentations to community and special interest groups,
- Active solicitation of public input through advertising in various media,
- Maintenance of an interactive web site that actively solicits questions, queries, and input,
- Production and distribution of informational brochures about our forest management activities and programs,
- Educational initiatives through the school system, interpretation projects, and an educational internet site, and
- Public opinion; and employee surveys.

Some recent examples related to these specific initiatives are further highlighted.

Fundy Model Forest

J. D. Irving, Limited was the original sponsor, is the primary industrial member, and is a very active partner in the Fundy Model Forest. The model forest program is an initiative under Canada's Green Plan. This project began in 1982 when 10 model forests were selected across Canada from a competitive proposal process. The Fundy Model Forest partnership is intended to provide a working model of managing forest resources, involving a broad cross section of multi-stakeholder input, working together, relying on consensus to balance economic, environmental, and social interests.

We have relied upon the Fundy Model Forest process and partnership to provide input to our forest management practices and activities, particularly in the Sussex District. We have utilized our Sussex District land base as a "testing ground" to develop and pilot new

processes, practices, methodologies, and technologies. We have fully participated in the public outreach, public input, and public education initiatives undertaken as part of the Fundy Model Forest program. This has included; research reports, newsletters, field tours, demonstrations, seminars, open houses, surveys, information sessions, and other public input initiatives. Over the past three years, developing and maintaining relationships with local Aboriginal communities has also been a major focus of the Fundy Model Forest program.

Stakeholder Advisory Committees

Based upon our experience in Sussex with the Fundy Model Forest partnership, we decided to establish local Stakeholder Advisory Committees in our other districts; in order to provide opportunities for public and local community input. With these committees, we are attempting to get representation from a broad range of stakeholders with an interest in forest management in the local area. Our objective is that these committees will be informed about, and provide input regarding our forestry practices, our forest management strategies, and other resource issues and values. We also hope that these committee members will be our (two-way) communication link to the broader constituencies they represent. Each of the local Advisory Groups is mandated to review its own membership and representation. The organizational structure, meeting formats and schedules are mutually agreed to within each specific committee. Members on these committees are volunteers, but J. D. Irving, Limited fully supports them from a logistical and facilitation perspective.

Within New Brunswick we have local Stakeholder Advisory Committees in the following areas:

- Chipman/Minto
- Doaktown/Boiestown
- St. George – Charlotte County
- Juniper – Florenceville
- St. Leonard – Grand Falls
- St. Francis/Clair

Those Stakeholder Advisory Groups in areas where we manage Crown Licenses (Chipman/Minto, Doaktown/Boiestown, St. George – Charlotte County and the Fundy Model Forest partnership) have met over the past several months specifically to discuss the 2002 Crown Land Management Plan process and our proposals in this regard.

In addition, the company has been involved with, and worked productively with several more focussed and special interest groups in specific locations or on specific issues. Examples in this regard include:

- A Kingston Peninsula and Washedemoak Citizen's Group, concerned about forestry practices in their local areas (Sussex);
- The Ayres Lake Group, interested in recreation and aesthetics near Ayres Lake (Deersdale);
- Numerous local Watershed Groups, established to provide input regarding local watershed management (all our New Brunswick Districts);
- Numerous local Recreational Groups, including Fish & Wildlife Groups, Hikers, Snowmobilers, All Terrain Vehicle users, and other outdoor enthusiasts groups (all our Districts);
- Relationship building with some Aboriginal Communities (Chipman, Sussex, Deersdale).
- Meeting with Sub-Licensees to discuss forest management issues and review plans and processes.

J. D. Irving, Limited has also established several scientific input committees. These include:

- J. D. Irving, Limited's "**Forest Research Advisory Committee**" established to provide input and advice regarding the company's forest practices and research initiatives and priorities; particularly with respect to ecological and environmental issues.
- J. D. Irving, Limited's "**Pesticide Advisory Committee**" established to provide input and advice regarding the company's pesticide use and possible alternative strategies.

These scientific committees provide direct communications between J. D. Irving staff and recognized experts in specific fields.

In addition, the company participates in numerous User Groups or Research Committees who also provide a valuable input function to improving our practices and forest management.

Public Outreach Initiatives

J. D. Irving, Limited has been very active participating in different public outreach initiatives. We regularly host field tours for community and special interest groups. We attend many community events including fairs and field days. We accept many requests to present information or speak at various community functions, or communicate with community groups. For several years we have been tracking our "Public Group Contacts". In the past many of our district staff have had specific objectives in this regard. On average, J. D. Irving Woodlands staff speak directly to more than 50,000 people about our forest management and on-the-ground practices each year.

Soliciting Public Input Through the Media

The company has been proactive in soliciting public input/questions/queries/comments

through the media. These include television advertisement, newspaper advertisement and inserts, distribution of brochures, and use of the Internet. Some specific examples include:

- In 1992, as we prepared a Crown Land Management Plan, we ran a full-page advertisement in the Saturday edition of the provincial newspaper outlining the process and requesting comments (very low response rate).

- In 1998 we inserted an 8-page informational brochure describing our most recent Crown Land Management Plan into the Saturday edition of the provincial newspaper. While this insert requested comments and questions, we had a very low response rate.

- During recent summer seasons, we sponsor the Daily Forest Fire Index Report on a local television station. Our accompanying advertisement provides contact information.

- Our company maintains two web sites, one that is targeted towards students and educators (www.ifdn.com); as well as a corporate web site (www.jdirving.com). Both these web sites request and welcome input or questions, and provide direct easy e-mail access. We get some excellent input and questions from these sites.

Production and Distribution of Informational Brochures

The company has produced and distributed many informational brochures that cover all aspects of forest management and the forest products industry. These brochures are readily available and are openly provided to anyone requesting information about the company or our practices.

Educational Initiatives

The company has undertaken and has been directly responsible for several outstanding and award winning educational initiatives. **The Forest Discovery Box** was an outcome of a partnership with the New Brunswick Department of Education and J. D. Irving, Limited to foster a greater understanding of the region's forest resource. The program was meant to be credible, contemporary, fun, bilingual, and cross-curriculum. Three New Brunswick teachers and J. D. Irving staff developed the Discovery Box. It features six videos, hands-on samples, as well as numerous teaching aids and other resource materials. A Forest Discovery Box was delivered to every school in New Brunswick. Based upon the surveyed results of this initiative, a forestry education web site was developed by the company. This web site is being continuously updated with additional educational material. A supporting newsletter for teachers is also periodically produced. This educational initiative is both directly and indirectly related to facilitating public input to our forest management activities. By providing educational material and

opportunities, knowledge is made available.

Parks And Interpretive Sites

The company has developed several parks and interpretive areas with a specific educational and communication focus. These include:

- **The Irving Nature Park**, in Saint John;
- **La Dune de Bouctouche**, in Bouctouche, New Brunswick; and
- **The New France Historical Site** near Weymouth, Nova Scotia.

Each of these sites is educational in nature. The Irving Nature Park and La Dune de Bouctouche is fully staffed with trained professional ecologists. These sites and our staff at them are intimately involved with thousands of visitors each year. They also serve as important "gateways" for public input to the company and our forest practices.

In addition to these interpretation areas, the company maintains numerous other recreational developments that also attract public use and public input.

Public Opinion Surveys

J. D. Irving, Limited regularly participates in public opinion surveys. These surveys are professionally designed, and carefully done by third party firms in order to provide public opinion information on current topical issues. The company also undertakes employee surveys on an annual basis.

These briefly highlighted initiatives provide an overview of J. D. Irving, Limited's public consultation processes and initiatives.

LAND BASE DESCRIPTION

The Fundy License (License #7) which is located in the southeastern area of the province encompasses approximately 400,547 hectares. License 7 is located within the counties of Northumberland, Kent, York, Sunbury, Westmorland, Queens and Charlotte, and two DNRE Regions (2 and 3) as shown in Figure 1.

Of the total license area, almost 89% is productive forestland (355,421 hectares). The remaining 11% is composed of water and wetlands (6%), roads and other right-of-ways (2%), or other non-forest land (3%), as shown in Figure 2.

Figure 2: Summary of the total area by land classification on the Fundy License.

The forest cover type distribution of the productive forest within the Fundy License is summarized in Figure 3. Approximately 62% of the productive forest is dominated by softwood cover types, while 23% is hardwood, and 15% is mixed wood types.

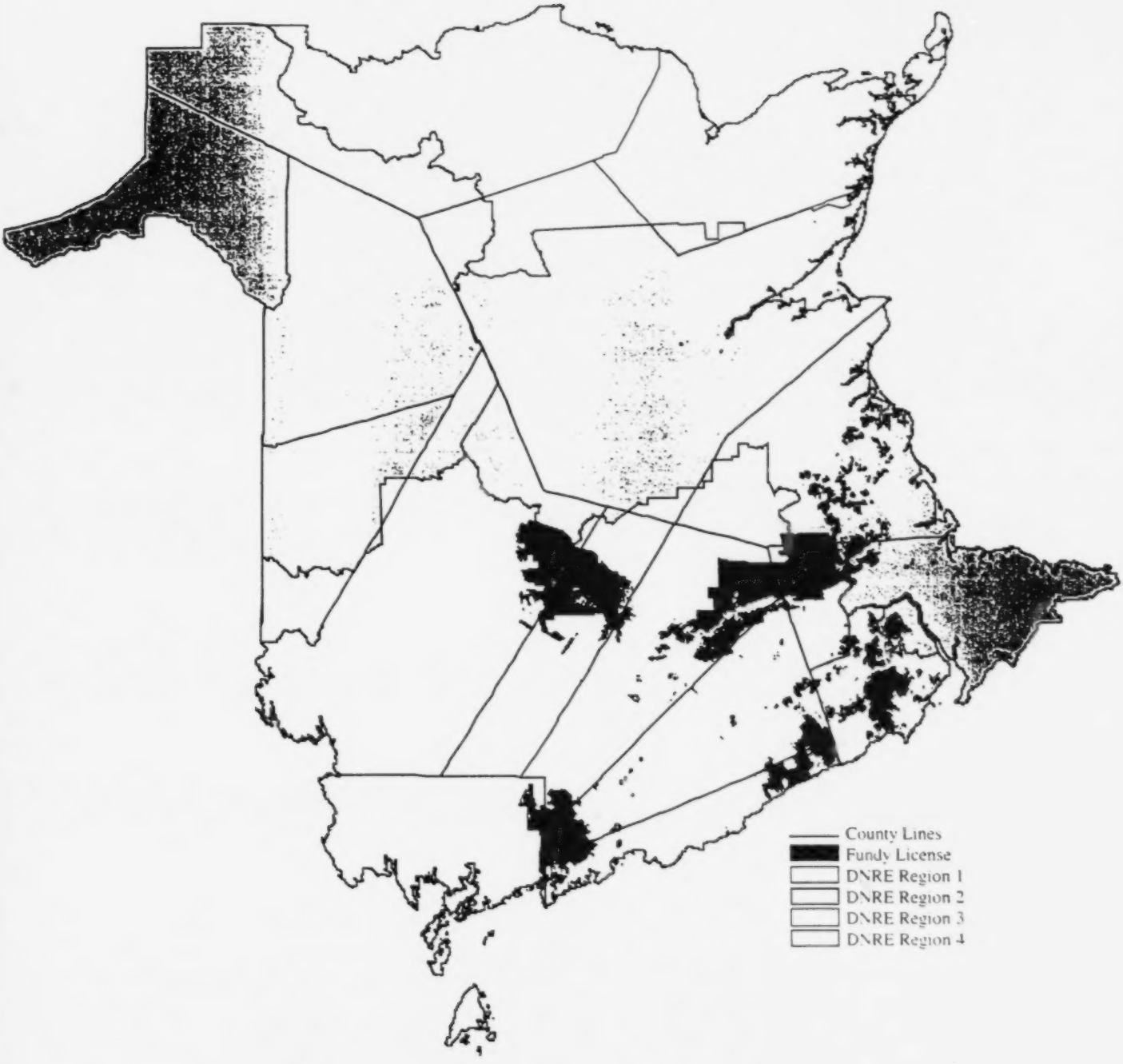


Figure 1: The Fundy License highlighted by DNRE regions and provincial county lines.

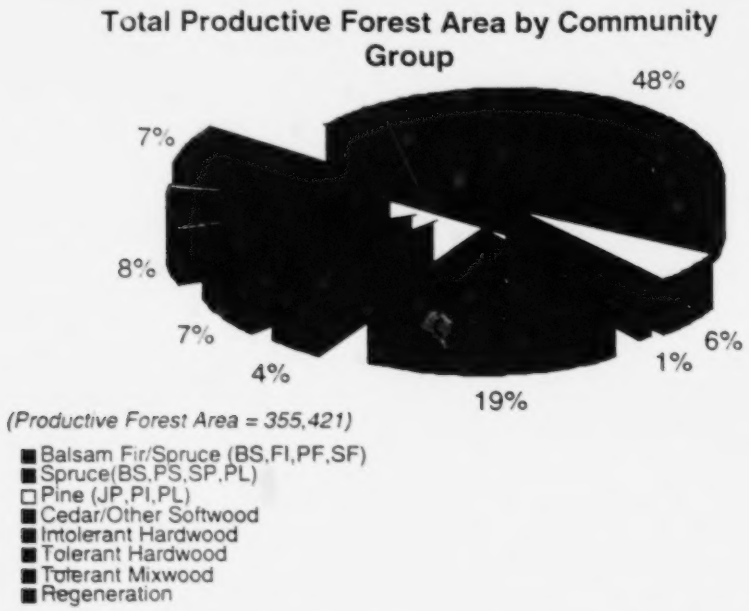


Figure 3: Forest community distribution for the productive forest.

More than 32,000 hectares have been planted since 1977. In addition, more than 30,000 hectares of naturally regenerated stands have been pre-commercially thinned over the past 20 years.

The net merchantable growing stock on the Fundy License is presently estimated to be approximately 32 million cubic meters. Softwood species, dominated by spruce, fir, and Jack Pine, make up 19 million cubic meters; while hardwoods comprise approximately 12 million cubic meters. Figure 4 depicts the growing stock composition, by species on the License.

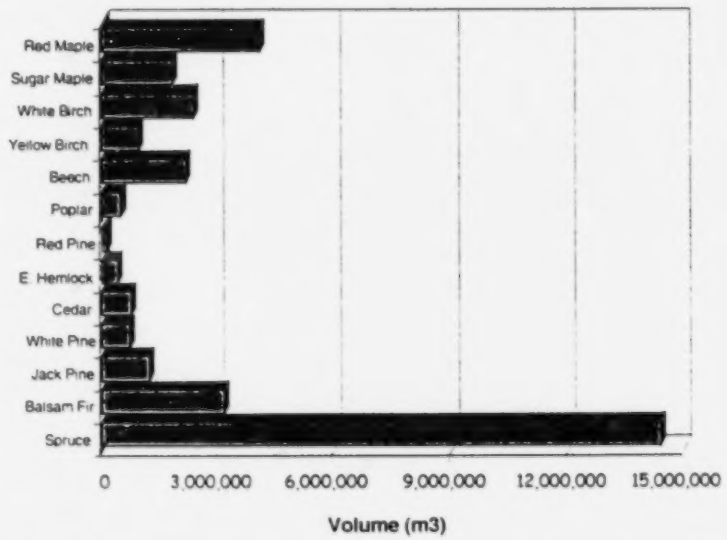


Figure 4: Merchantable inventory by species reported in cubic meters.

The age-class distribution of the Fundy License could be generally characterized as having a preponderance of area in an over mature condition, and a large area in regenerating and immature stages. This unbalanced age-class structure provides a distinct management challenge, and highlights the importance of maintaining the productivity of intensive silvicultural investments such as tree planting, pre-commercial thinning, and other stand tending treatments. Figure 5 shows the area by broad forest community type within each age class.

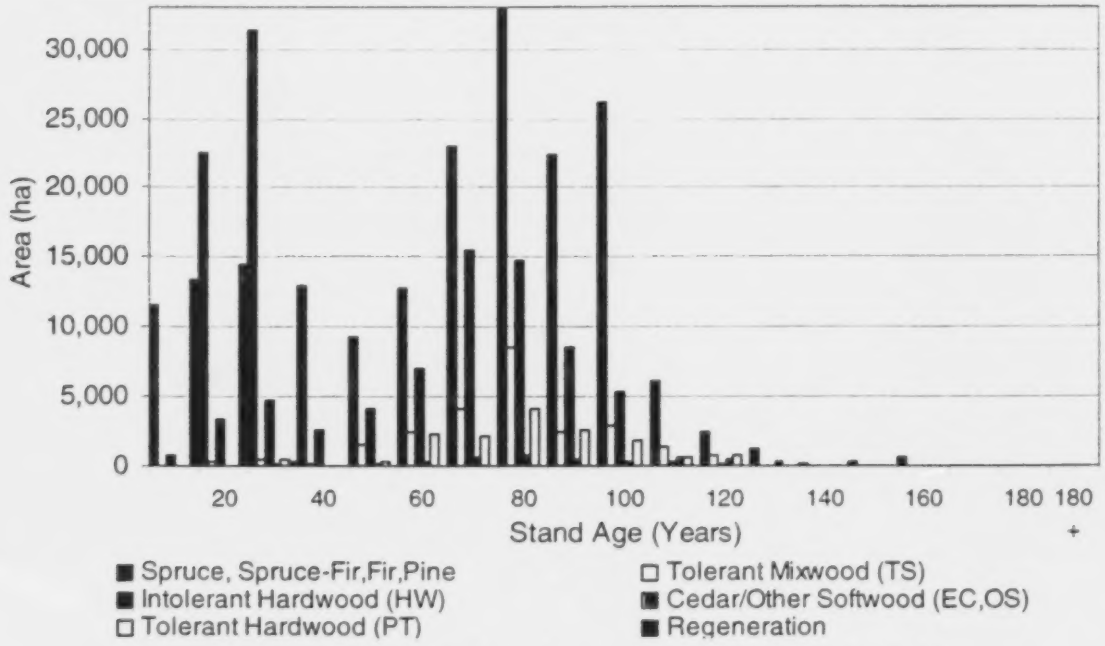


Figure 5: Age-class structure by forest community grouping on the Fundy License.

The Fundy License lies within five eco-regions. The majority of the land base occurs within the Continental Lowlands (Eco-region 5) and Eastern Lowlands (Eco-region 6) encompassing approximately 249,100 hectares or 62% of the License. Table 2 outlines the area distribution of forested land within each eco-region. Figure 6 depicts the actual boundaries of each eco-region within the Fundy License.

Table 2. Land distribution according to eco-regions.

Eco-Region Name	Eco-Region Number	Area (ha)	Percent of Land base (%)
Southern Uplands	3	48,729	12
Fundy Coastal	4	36,435	9
Continental Lowlands	5	113,592	28
Eastern Lowlands	6	135,517	34
Grand Lake	7	66,272	17

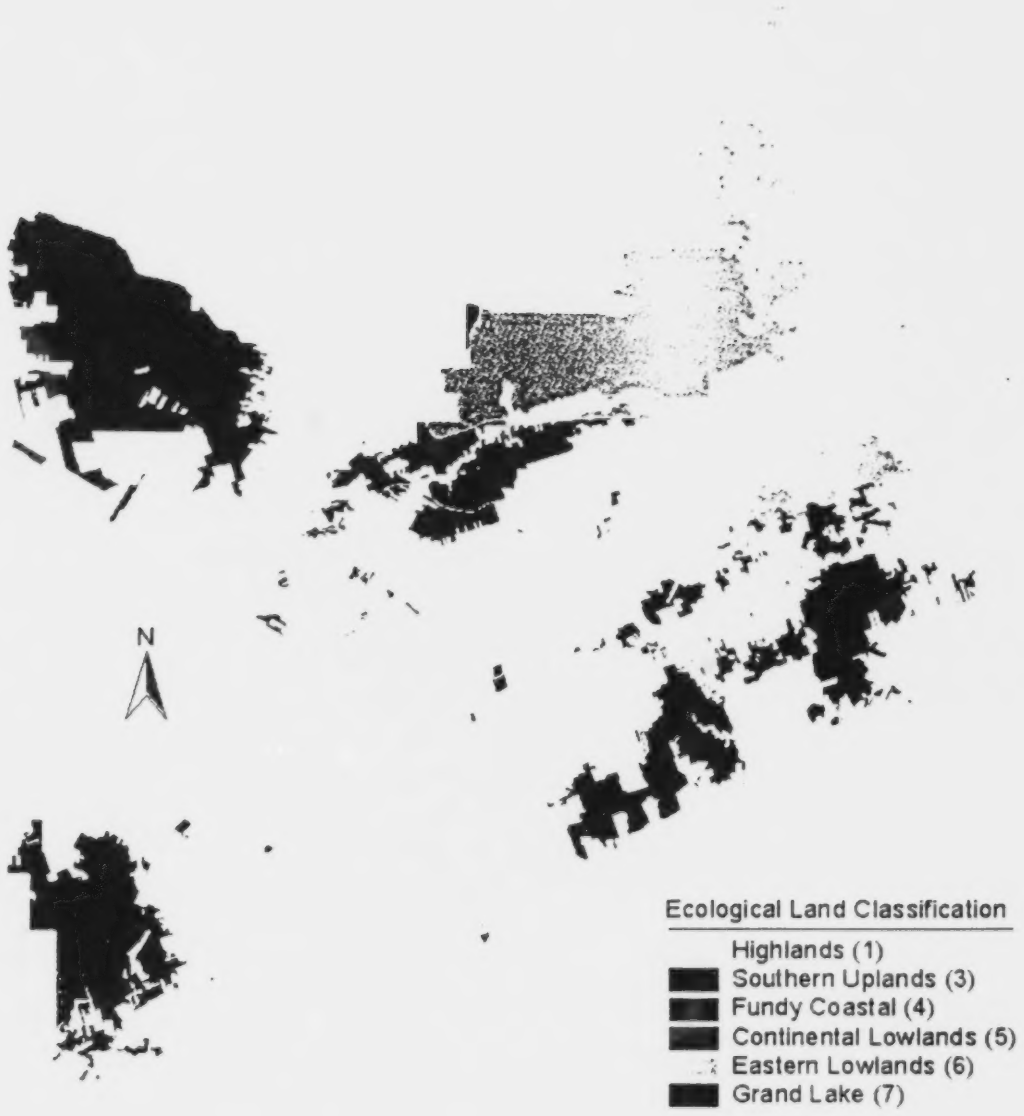


Figure 6: Eco-regions within the Fundy License.

The 5 eco-regions, which were defined under the Ecological Land Classification System, are of particular importance in this new management plan. DNRE has established several specific forest community, wildlife habitat, and biodiversity objectives for each eco-region.

Within the Fundy License, we have recognized several separate and distinct "Special Management" zones, each of which has different primary management objectives. These zones include four "Protected Areas" (Grand Lake Meadows, Caledonia Gorge, Canaan Bog, and Loch Alva) covering approximately 41,270 hectares. Approximately, 7,490 hectares are "Unique Areas" (including Sugar Leases and "Reserves"). Deer Wintering Area Management Units (DWAMUs) compose 23,230 hectares, "Old Spruce-Fir" (OSFH) blocks cover 24,104 hectares, and 32,594 hectares are designated as watercourse buffer zones. The "General Forest Zone" covers the remaining 271,859 hectares. The non-timber zones are not mutually exclusive (i.e. there may be DWAMUs in a proposed protected area); however, we have reported the hectares according to the highest reservation category priority. Figure 7 and Table 3 summarizes the area and proportion of the total license area within each zone.

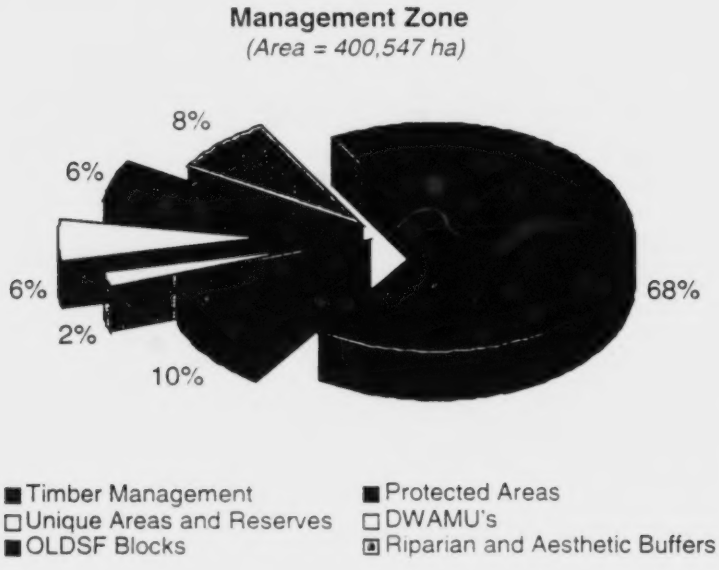


Figure 7: Summary of the primary management zones within the Fundy License.

Table 3. Area distribution of special management zones on the Fundy License.

	Total Forest							Productive Forest
	Protected Areas (ha)	Unique Areas (ha)	DWAMUs (ha)	OLDSF Blocks (ha)	Buffers (ha)	Total Area (Not Mutually Exclusive) (ha)	Total Area (Mutually Exclusive) (ha)	Total Area (Mutually Exclusive) (ha)
Protected Areas	41,270	1,227	3,262	8,267	7,247	41,270	41,270	33,790
Unique Areas and Reserves	1,227	8,717	514	1,727	1,300	8,717	7,490	5,794
DWAMUs	3,262	514	26,743	1,485	4,831	26,743	23,230	21,476
OLDSF Blocks	8,267	1,727	1,485	35,720	4,970	35,720	24,104	21,987
Riparian and Aesthetic Buffers	7,247	1,300	4,831	4,970	48,094	48,094	32,594	25,860
Total							128,688	108,907

The actual location of these different zones is shown on the map in Figure 8. Distinct management strategies have been developed for each management zone, which are based on separate and specific objectives, prescriptions and practices deemed appropriate for each zone. The objectives and the strategies for each zone will be explicitly discussed later within this document.

More than 142,000 individual forest stands make up the productive forest in the Fundy License. For classification, monitoring and forecasting purposes, these stands have been stratified into 70 separate strata based upon vegetative forest communities and developmental patterns. The algorithm used to determine the forest community grouping is summarized in Figure 9.

An area summary and brief description of the strata defined for the Fundy License is provided in Appendix III.

The forest stratification, combined with site information (eco-region/eco-district, site productivity) and silvicultural or harvesting interventions provide the basis for growth, yield and future development patterns.

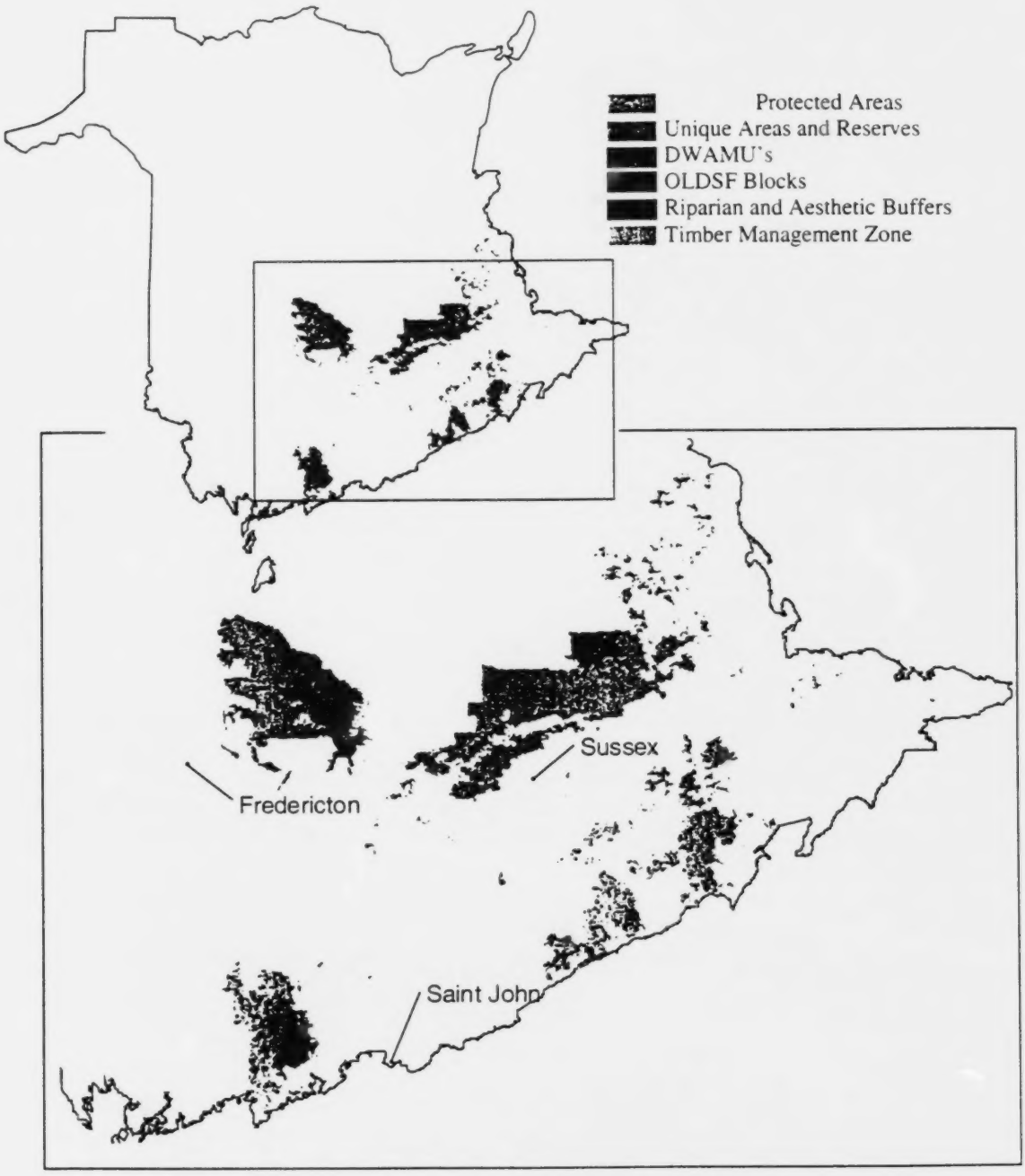


Figure 8: Primary management zones within the Fundy License.

Forest Community Cover Type Key
(all percentages are of total volume)

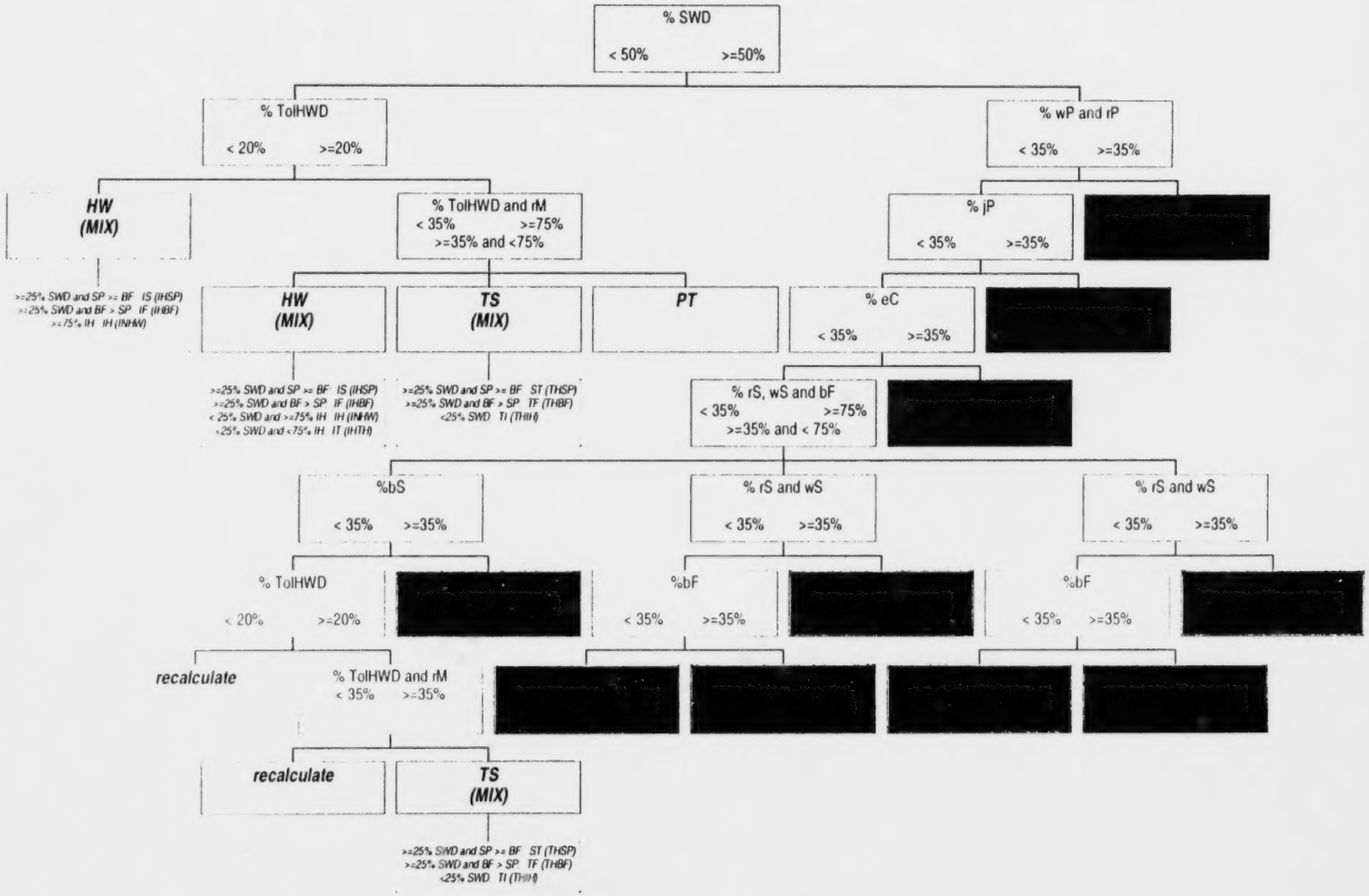


Figure 9. Forest community cover type key.

GROWTH AND YIELD

Each of the 70 forest strata on the Fundy License is assumed to follow a specific growth, yield and development pattern. These patterns have been developed from ground plot data (including forest development survey (FDS) plots and permanent sample plots (PSP)). Forest strata development is also affected by factors such as: climate, drainage, site productivity, topography, insects, disease, competition, silvicultural and/or harvesting or other interventions, genetic quality, as well as vegetative composition. Each of these factors significantly affects growth and yield development, which in turn affects product and/or habitat suitability and quality. Growth and yield curves, habitat "windows" and development patterns have been defined for each forest strata, based upon the major expected influencing factors, and silvicultural or harvesting interventions.

A summary of the expected peak yield, age and habitat suitability for each of the strata is outlined in Appendix IV.

A brief description of the photo interpretation, forest stratification process, harvest response matrix, and verification of the yield curve construction process is provided in Appendix V. Appendix VI also includes a visual representation of each yield curve.

HARVEST AND SILVICULTURE PRESCRIPTIONS

A variety of harvest and silvicultural prescriptions will be utilized on the Fundy License in order to achieve the management objectives for the land base. Specific prescription and treatment scheduling will depend upon the unique stand level conditions and the stand level, landscape level, product quality and flow objectives. In addition, any treatments or strategies must be in full compliance with both DNRE and company policies, and our "Best Management Practices" (BMP's). Follow up monitoring and reporting will be undertaken, as required, to ensure that silviculture and regeneration objectives have been achieved.

It is very important to note that every silvicultural and harvest prescription will be developed specifically for, and adjusted to fit the specific site conditions. However, for management planning and landscape level analysis purposes; prescriptions, strategies, and schedules have been modeled and forecast on a more general strata basis.

For the 2002-2026 Fundy License Management Plan, we are planning to utilize a suite of nine general harvest prescriptions. These include:

- variable retention clear-cutting
- over story removal,
- patch cutting,
- partial cutting,
- shelterwood and multiple pass harvesting,
- commercial thinning,
- salvage harvests,
- single tree selection, and
- group selection.

Harvest Treatments

Variable Retention Clear-cutting:

Variable retention harvest prescriptions remove almost all merchantable stems of all species in a single treatment. This prescription is generally applied to even-aged mature or over mature stands, leading to even-aged regeneration through natural processes or tree planting. In some variable retention situations, a "Seed Tree" harvest prescription will be utilized. Within the harvested area, attention is paid to maintain sufficient vertical structure and biodiversity by leaving residual trees, clumps or islands of native trees and advanced natural regeneration. This variable retention is considered to be important for wildlife and to maintain natural disturbance and biodiversity patterns. We have assumed that approximately 3% of the pretreatment volume will remain as residual stand components following this prescription.

Over story Removal:

Over story removal harvest prescriptions remove almost all merchantable stems of all species in a single treatment entry. This even-aged management prescription pays particular attention to the protection and release of well established regeneration in the under story (*generally greater than two meters in height*). Full planting is not required following an over story removal harvest, however a very minor level of fill planting of trails or small un-regenerated patches within the block may be prescribed. Maintenance of sufficient vertical structure is also a consideration in over story removal prescriptions, and we assume that 3% of the pretreatment volume will remain as a residual component of the new stand.

Patch Cutting:

Patch cut or strip cut prescriptions are even-aged management, similar to clear-cuts or over story removals, however the opening size is much smaller; typically less than two hectares in size. Approximately 30% to 40% of the stand area (and volume) will be harvested during the first entry, (*modeled as 33% removal*). Patch Cutting is even-aged management, and the re-entry period between treatments is typically only 5 to 15-years. In some Patch Cutting prescriptions (Patch #2), the remaining two thirds of the harvest block entry will be removed 5 to 15-years later (*modeled as 10 years re-entry*). In other Patch Cutting prescriptions (Patch #3); there will be two subsequent entries, separated by 10 years, removing 33% of the stand area each entry. This prescription is often utilized to address adjacency concerns, or to promote natural regeneration.

Partial Cutting:

Partial cutting targets harvesting of specific species or species groups (*i.e. balsam fir or spruce/fir*) while other species are generally left standing. Partial cuts may be prescribed when a particular species is overly predominant or is becoming decadent well ahead of most of the other species in the stand. Frequently, however, partial cuts are prescribed with an intention that the stand will be operated again in the near future. A partial cut prescription is usually associated with an even-aged management strategy. The partial cutting prescription is not ideal or preferred; however, it may be utilized on occasion, at the operating plan level, often associated with harvesting spruce or fir and leaving residual stands of primarily hardwood over stories.

Shelterwood and Multiple Pass Harvesting:

The shelterwood and multiple pass treatments are often practiced in stands with a goal of promoting natural regeneration, salvaging morality or eliciting growth response in the residual over story. In most situations this prescription is even-aged management; however, in some cases the long-term objective may be to create all aged stands. In the majority of shelterwood or multiple-pass harvest prescriptions, up to 40% of the standing volume is removed in the first pass (*modeled as 33% removals*), focussing on the shorter

lived species and lower quality or less vigorous trees. The second entry is normally delayed by 5 to 10 years, depending upon the specific stand conditions and objectives. There are some variations on the standard shelterwood that may be prescribed in specific circumstances including irregular shelterwood and some group selection methods.

Commercial Thinning:

Commercial thinning is generally prescribed in planted stands or previously pre-commercially thinned areas. The primary objective of this treatment is to remove a portion of the trees, usually focusing on lower quality stems, in order to allow the remaining trees to continue growing vigorously. This prescription generally removes 20% to 40% of the volume in the first treatment *(modeled as 30% removal)*. Some stands, especially those that have been planted, may undergo two or three commercial thinnings. Depending upon the species, density and site productivity, commercial thinnings may be prescribed in stands varying from 20 to 50 years old. Once a stand has been commercially thinned, it is "locked out" from harvest eligibility for the next 10 year period (*i.e. a stand commercially thinned at age 30, is not eligible for further harvest activity until at least age 40*).

Salvage Harvests:

Salvage harvesting is usually only prescribed in specific situations to salvage recent or imminent mortality, or small-scale wind throw, in stands that would otherwise not be scheduled for harvesting in the very near future. These prescriptions would most often be utilized along roadsides, block edges, in some riparian zones or other special management zones (*i.e. unique areas*). These prescriptions are not blocked in the Management Plan; however, they will be utilized in specific instances as necessary.

Single Tree Selection:

Single tree selection harvest is usually classical uneven-aged management. Ideally this prescription targets tolerant hardwood, tolerant mixed wood, or cedar dominated stands. It may also be used in stands with significant components of Red Spruce, White Pine or Hemlock. In addition, non-timber primary management objectives in riparian zones or in recreational and aesthetically important areas may result in a single tree selection treatment being utilized.

Typically, uneven aged management may remove 20 to 40% of the stand volume each entry (*modeled as 33%*), depending upon the specific stand condition. Each entry is normally separated by 15 to 30 years (*modeled as 20 year re-entries*). The objective of the single tree selection treatment is generally to develop a full range of age and diameter classes in the stand; as well as to provide a suitable diversity of tree species at all times.

Group Selection:

The objective of the group selection prescription is to create and maintain an uneven-aged stand condition, and it is usually directed to sites and species compositions that will be managed on a single tree selection basis in the long term. The group selection treatment often targets stands where the long-term objective is to promote a different species composition than is presently occurring on the site. Some examples in this regard include:

- promoting Yellow Birch over Beech,
- promoting spruces over Balsam Fir, and
- introducing Red Spruce or White Pine into the stand composition.

Ideally the opening size in-group selections is less than one hectare, and in many specific circumstances it is much smaller. Individual trees may be left standing in the opening, particularly if they contribute to the long term management objectives for the stand (i.e. pole size hardwoods or saplings of desired species). The entry period after the group selection prescriptions is generally 10 to 30 years (*modeled as 20-year re-entries*). The earlier re-entry prescriptions will be used in some situations to accelerate transition to uneven-aged management. Normally these prescriptions remove 20% to 40% of the merchantable standing volume in a single entry (*modeled as 33% removal in the first entry*), depending upon the specific stand conditions. In some situations an entire stand may be operated in one treatment using a combination of individual tree, and group selection prescriptions. Group selection prescriptions are included with single tree selection prescriptions for modeling purposes.

A more technical description of the harvest prescriptions planned for use within each specific strata is provided in Appendix VII.

A summary of the harvest prescription eligibility for each strata is provided in Table 4 (*a more descriptive summary can be found in Appendix VIII*). It is very important to note, that every silvicultural and harvest prescription will be developed specifically for and adjusted to fit the specific site conditions. However, for management planning and landscape level analysis purposes; prescriptions, strategies and schedules will be modeled and forecast on a more general strata basis. In addition, any treatments or strategies must be in full compliance with both DNRE and company policies, and our "Best Management Practices" (BMP's).

Table 4. Harvest prescription eligibility for the Fundy License.

Forest Community Type	Harvest Prescription						
	Variable Retention	Overstory Removal	Patch #2	Shelterwood	Single Tree / Group Selection	Patch#3	Commercial Thinning
BS(BlackSpruce,HighCrownClosure)	x	x	x	x	x	x	x
BS(BlackSpruce,LowCrownClosure)	x	x	x	x	x	x	x
EC(Cedar,HighCrownClosure)	x		x	x	x	x	
EC(Cedar,LowCrownClosure)	x		x	x	x		
HW(intolerantHardwood)	x	x	x	x	x	x	x
HW(Spruce-TolerantHardwood)	x	x	x	x	x	x	
JP(JackPine,HighCrownClosure)	x	x	x	x	x		x
JP(JackPine,LowCrownClosure)	x	x	x	x	x		x
OS(OtherSoftwood)	x	x		x	x	x	
PF(BalsamFir)	x	x	x	x	x	x	x
PI(Pine)	x	x	x	x	x	x	x
PS(PureSpruce,HighCrownClosure)	x	x	x	x	x	x	x
PS(PureSpruce,LowCrownClosure)	x	x	x	x	x	x	x
PT(PureTolerantHardwood)	x	x	x	x	x	x	x
SF(Spruce-Fir)	x	x	x	x	x	x	x
SP(Spruce-TolerantHardwood)	x	x	x	x	x	x	
SP(Spruce-IntolerantHardwood)	x	x	x	x	x	x	x
TS(TolerantHardwood/Softwood)	x	x	x	x	x	x	x
TS(Intolerant-TolerantHardwood)	x	x	x	x	x	x	x

Intensive Silviculture Treatments

Several intensive silvicultural treatments provide an opportunity to increase both the short and long-term yield of desired timber products as well as meeting some specific habitat objectives.

We are interested in maximizing the long-term yield of solid wood products from the Fundy License in an environmentally responsible and sustainable manner. Several cost-effective silviculture treatments will be utilized in order to help achieve this objective. Some of the on-the-ground silviculture treatments that will be undertaken in this regard include:

- tree planting treatments,
- pre-commercial thinning,
- herbicide release, and
- commercial thinning.

Tree Planting:

Areas that have been clear-cut may be eligible for, and benefit from, planting if the area is not sufficiently stocked with natural regeneration. Depending upon the specific site conditions, the following species may be planted:

- Black Spruce,
- White Spruce,
- Red Spruce,
- Norway Spruce,
- Jack Pine,
- White Pine, or
- Red Pine.

In addition, minor amounts of species like Eastern White Cedar, Red Oak or Basket Willow may also be planted for site rehabilitation or wildlife reasons.

On most harvested areas that are planted, a combination of species or mixed species are actually employed. Careful consideration is made in each prescription to plant a species that is appropriate for each specific site. When a harvested area is prescribed to be planted, care is taken to protect the healthy advanced regeneration that already occupies the site. We avoid planting a tree within one meter of any vigorous natural regeneration. During scarification, care is also taken to protect patches of regeneration and vigorous individual trees.

The vast majority of our planting prescriptions are "full planting" where approximately 2,200 trees per hectare are planted and the area is usually first site prepared by scarification. On occasion however, an area may be "fill planted" where the land is not scarified and substantially less trees are planted due to the advanced regeneration that is present. "Under planting" prescriptions, where trees are planted under a mature over story, may also be utilized (i.e. White Pine, Red Spruce, Cedar, Red Oak).

A "Tree Improvement" program is in place to improve the genetic quality and adaptability of the planting stock. This work has been well underway for almost 20 years, focusing on the spruces and pines that we commonly plant. The future yield improvements that we expect as a result of this program have been scheduled and incorporated into the our growth and yield curves utilized in this Management Plan. The level of improvement and availability of improved planting stock is summarized in Table 5.

Table 5. Summary of yield increases as a result of tree improvement for the Fundy License.

Species	Average Yield Improvement	Year of Planting that this Increased Yield Starts
White Spruce	5%	1992
	10%	1997
	20%	2007
Black Spruce	5%	1992
	10%	1997
	15%	2002
	20%	2007
Red Spruce	5%	2002
	10%	2007
Norway Spruce	10%	2007
Jack Pine	5%	1992
	10%	1997
	15%	2002
	20%	2007

Several other silvicultural operations are often carried out in conjunction with tree planting prescriptions. These include:

- site preparation,
- herbicide release,
- manual cleaning,
- pre-commercial thinning,
- commercial thinning, and
- insect control.

All of these treatments, including tree planting, have very detailed and specific policies and procedures that must be complied with. The full suite of treatments is not automatically prescribed for all planting situations. Each individual action is only undertaken after careful consideration of the costs, risks, and benefits and in full conformance with DNRE policies and procedures.

Historically, the species that have been most often planted include black spruce, Jack Pine and white spruce. To date, more than 33,000 hectares have been planted on the Fundy License.

The following tables (Table 6 and Table 7) summarize the expected yields forecasted for our planted stands.

Table 6. Pre 1982 plantation yield characteristics.

	Age 35		Age 45		Age 55	
Stratum	m^3/ha	m^3/tree	m^3/ha	m^3/tree	m^3/ha	m^3/tree
Black Spruce	135	0.08	193	0.11	231	0.15
Other Spruce	155	0.11	193	0.15	232	0.20
Jack Pine	152	0.09	188	0.13	211	0.17

Table 7. Post 1982 plantation yield characteristics on different site classes (without tree improvement).

	Age 35		Age 45		Age 55	
Stratum	m3/ha	m3/tree	m3/ha	m3/tree	m3/ha	m3/tree
Site Class 1						
Spruce	152	0.10	207	0.14	252	0.19
Jack Pine	215	0.15	268	0.21	312	0.26
Site Class 2						
Spruce	121	0.08	173	0.11	220	0.15
Jack Pine	181	0.11	232	0.16	275	0.21
Site Class 3						
Spruce	85	0.06	129	0.09	178	0.12
Jack Pine	136	0.09	186	0.12	228	0.16

Pre-commercial Thinning:

Naturally regenerated areas may be eligible for, and receive a pre-commercial thinning treatment if there is both a high stocking (>60%) and a high density (>4,000 stems per hectare) of commercial tree species. This work is usually done using manual crews with mechanized brush saws. The actual scheduling, target density and species composition of these treatments are prescribed on a site by site basis. Generally, pre-commercial thinning is focused on naturally regenerated areas 10 to 20 years post harvest with a post treatment target density of 2,500 to 3,000 stems per hectare.

In most situations these treatments result in softwood dominated stands; however, these prescriptions can also improve the quality and composition of mixed wood and hardwood stands. The species priority is established for each specific treatment area, however, species such as White Pine, spruce, Yellow Birch and Sugar Maple are most often favored.

The objective of a pre-commercial thinning prescription is to treat fully stocked regenerating stands in order to avoid stagnation and to release 2,500 to 3,000 future crop trees by providing them with sufficient space, sunlight, water, and nutrients in order to continue to grow vigorously. High quality dominant trees of desired species tend to be favored in this treatment. Site by site adjustments to the species priority provides an additional opportunity to "steer" the stand to the most desired or appropriate species composition.

On the Fundy License, a pre-commercial thinning program directed to developing softwood, mixed wood, and hardwood stands will continue to be an intricate component of the management strategy. Many of the stands that have been pre-commercially thinned will be subsequently eligible for, and treated with a commercial thinning prescription. The following tables (Tables 8 and Table 9) show the projected yield of pre-commercially thinned stands.

Table 8. Yield characteristics of pre 1985 pre-commercially thinned natural stands.

	Age 35		Age 45		Age 55	
Stratum	m^3/ha	m^3/tree	m^3/ha	m^3/tree	m^3/ha	m^3/tree
Spruce	116	0.09	159	0.11	202	0.14
Spruce-Fir	97	0.06	150	0.08	191	0.10
Fir-Spruce	83	0.07	130	0.10	178	0.12

Table 9. Yield characteristics of post 1985 pre-commercially thinned natural stands.

	Age 35		Age 45		Age 55	
Stratum	m^3/ha	m^3/tree	m^3/ha	m^3/tree	m^3/ha	m^3/tree
Site 1	123	0.08	181	0.12	231	0.16
Site 2	91	0.05	144	0.08	194	0.11
Site 3	60	0.03	104	0.05	146	0.08

Herbicide Release:

The use of herbicides is a silvicultural tool that is very carefully scrutinized prior to its use. In some situations, however, competition to young regeneration from grasses, raspberries or other brush species necessitates this treatment. Herbicide release is often prescribed to release young-planted areas 1 to 5-years after establishment. Only very rarely is the treatment used for site preparation or to release existing natural regeneration. Over the past three years the herbicide release treatment level on the Fundy License has

averaged approximately 3,000 hectares per year. The herbicide product utilized by the land manager has been "Vision" (glyphosate); however, there have been trials using "Release" (tryclopyr). These treatments are most often applied using rotary wing aircraft, however, some ground applications may be utilized.

We are actively working to minimize our dependence upon the use of pesticides. We have undertaken and participated in research and comparative trials to:

- reduce application rates,
- improve the application technology,
- use alternative methods, and
- forego treatments.

If and when necessary, the herbicide release treatment is undertaken using carefully trained, licensed staff, and state of the art technology and equipment.

Commercial Thinning:

The commercial thinning prescription has already been described in the discussion about harvesting treatments utilized on the License. It is important to reiterate, however, that this prescription is really a silvicultural investment (and cost) that is focused on releasing and maintaining the future crop trees in a vigorously growing condition.

The stands that are most often scheduled to receive a commercial thinning treatment are those that have been previously planted or pre-commercially thinned. For management planning purposes, we are not planning to do commercial thinning in Jack Pine plantations. The following tables (Table 10 and Table 11) show the yield projections for the commercially thinned stands.

Table 10. Commercial thinning yield characteristics of pre-1982 plantations or pre-1985 pre-commercial thinning.

Stratum	Thinning Entry	Volume Extracted (m^3/ha)	Piece Size (m^3/tree)	Operable Age*
Plantations				
Spruce	1	46	0.09	30
Black Spruce	1	41	0.07	30
Pre-commercially Thinned				
Spruce	1	56	0.11	40
Spruce-Fir	1	51	0.09	40
Fir-Spruce	1	50	0.10	40

* Operable age refers to the earliest age at which the commercial thinning can occur

Table 11. Commercial thinning yield characteristics of post-1982 plantations and post 1985 pre-commercial thinning.

Stratum	Thinning Entry	Site 1			Site 2		
		Volume Extracted (m^3/ha)	Piece Size (m^3/tree)	Operable Age*	Volume Extracted (m^3/ha)	Piece Size (m^3/tree)	Operable Age*
Plantations							
Black Spruce	1	37	0.07	30	37	0.07	35
Spruce (White or Norway)	1	49	0.08	25	48	0.08	30
Spruce (White or Norway)	2	52	0.12	40	52	0.11	45
Pre-commercially Thinned							
Spruce-Fir	1	50	0.10	35	43	0.08	40

* Operable age refers to the earliest age at which the commercial thinning can occur.

The actual suite of harvesting and silvicultural treatments that may be prescribed in a particular forest zone or stand will depend upon the management objectives for that zone and the specific condition of the stand. A generalized broad landscape level strategy is proposed for our Management Plan; however, at the Operating Plan level, detailed block and stand specific prescriptions will be planned and implemented.

SPECIAL MANAGEMENT ZONES

As previously noted, 32 percent of the Fundy License productive area lies in spatially referenced "Special Management Zones" where timber production is not the primary management objective. These include:

- Protected Areas (10%),
- Unique Areas and Reserves (2%),
- Deer Wintering Area Management Units (DWAMU) (6%),
- Old Spruce-Fir Habitat blocks (OSFH) (6%),and
- Watercourse buffer zones (8%).

It is also important to note that in addition to these spatially defined zones, it is required that many other non-timber objectives be met within the "General Forest Zone". Some of these objectives include:

- old and large succession stages,
- vegetation community levels,
- aesthetic buffers,
- recreational use and access,
- opening size and adjacency, and
- structural and biodiversity BMP's.

We have developed and are proposing a specific management strategy and an annual allowable harvest level for each of the spatially defined "Special Management Zones".

Protected Areas

DNRE has outlined four protected areas that occur (entirely or partially) on the Fundy License. These include:

- Caledonia Gorge,
- Canaan Bog,
- Grand Lake Meadows, and
- Loch Alva.

Figure 10 depicts the location of these areas within the Fundy License. The Loch Alva proposed protected area consists of a "Core Reserve" area that is immediately protected, plus a "Future Reserve" area where the level of harvesting outlined in the previous 1997 Management Plan would be permitted only until 2012.

We have completed an analysis of these new protected areas, and we have determined that approximately 41,270 hectares of the Fundy License is included within these protected areas; 38,732 hectares within the "Core Reserve" area, and 2,538 hectares within the "Future Reserve" area. We have also overlaid these reserve areas onto our 1997 blocked Management Plan in order to estimate the 25-year impact upon the previous plan. This analysis indicates that the Core Reserve Area has an immediate

impact of reducing the AAC on the Fundy License by 33,000 m^3 per year (18,000 m^3/yr for spruce/fir/jack pine; 13,000 m^3/yr for hardwood and 2,000 m^3/yr for other softwood (Table 12).

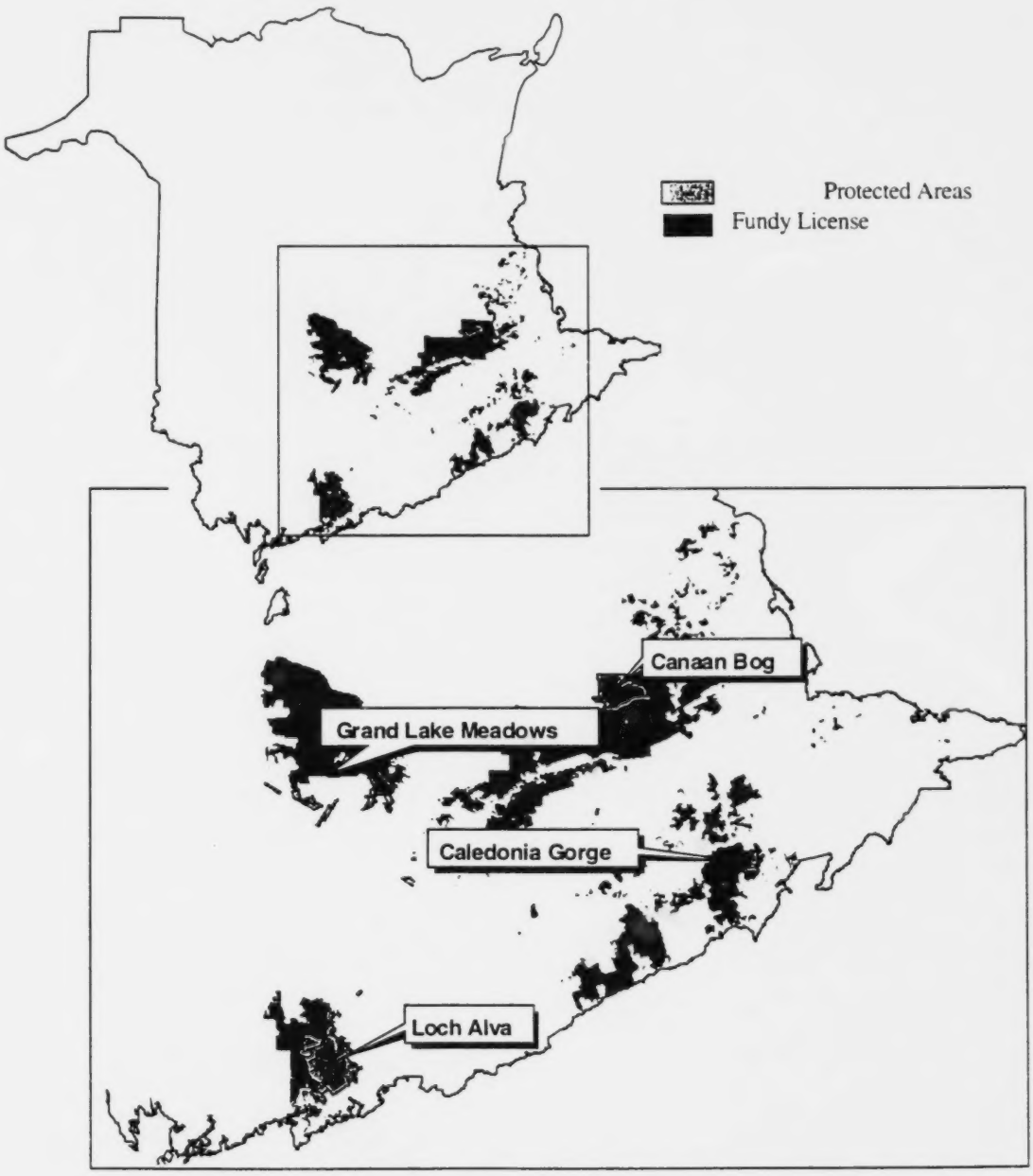


Figure 10: The protected areas within the Fundy License.

Table 12. Volume "locked out" per species group within the "Core and Future Reserve" areas, according to the 1997 Management Plan.

	SP/BF/JP M^3	OS m^3	WP m^3	HW m^3	Total Volume
Core	445,771	19,140	21,508	330,995	817,414
Future	48,355	2,842	3,044	54,325	108,616
Total	494,126	21,982	24,552	385,370	926,030

After reviewing and revising the scheduled but un-harvested 1997 Management Plan blocks within the Loch Alva "Future Reserves" area; we determined that approximately 23,000 m3 of spruce/fir/jack pine could realistically be harvested from that zone over the next 10 years. These results are summarized in Table 13.

Table 13. Planned harvest volume availability for the next 10 years (after operational net downs) from the "Future Reserve" area of the Loch Alva protected areas on the Fundy License.

Period	Spruce/Fir/ Jack Pine m^3/year	Hardwood m^3/year	White Pine Sawlogs m^3/year	Cedar Saw Material m^3/year
2002-2006	3,300	1,900	100	100
2007-2011	1,300	900	100	100

Note: These volume estimates have been "netted down" to account for operational blocking issues and product yield expectations.

Unique Areas and Reserves

We have become aware of, and we have designated 26 Unique Areas on the Fundy License. These areas are considered "unique" due to a biological, geological, geographical, cultural, recreational, or other characteristic feature of the area. In addition, the government has reserved a large area (2,270 hectares) within one kilometer along the Bay of Fundy coastline which is also included within the "Unique Area" land base zone (exclusive of area contained within the newly protected areas). Appendix IX summarizes the Unique Areas that have been designated on the Fundy License.

Our management strategy for the Unique Areas zone on the License is to manage each area to maintain and protect the unique feature or attribute. Forest harvesting is not necessarily prohibited within some of the Unique Areas; however, any management activity must be completely compatible with protecting that special feature. In many of the Unique Areas harvesting is not appropriate. In some areas however, very light harvesting activity or salvage harvesting may be acceptable from time to time. Prior to any harvesting activity within a designated Unique Area, our company policy requires that a management plan be developed specifically for the particular Unique Area.

For the purpose of management planning for the Fundy License, we have assumed that only salvage or selection harvesting will be undertaken within the Unique Areas zone on the land base. We have conservatively proposed that, for allocation purposes, an average of 600 m3/year could be salvaged from this Unique Areas zone. The species breakdown of this total volume is summarized in Table 14.

Table 14. Proposed harvest levels by species group for "Unique Areas" on the Fundy License (after "operational" net downs).

	Spruce/Fir/Jack Pine m^3/year	Hardwood m^3/year	White Pine Saw Logs m^3/year	Cedar Saw Material m^3/year
AAC	400	100	100	0

Note: These volume estimates have been "netted down" to account for operational issues and product yield expectations.

Deer Wintering Area Management Units

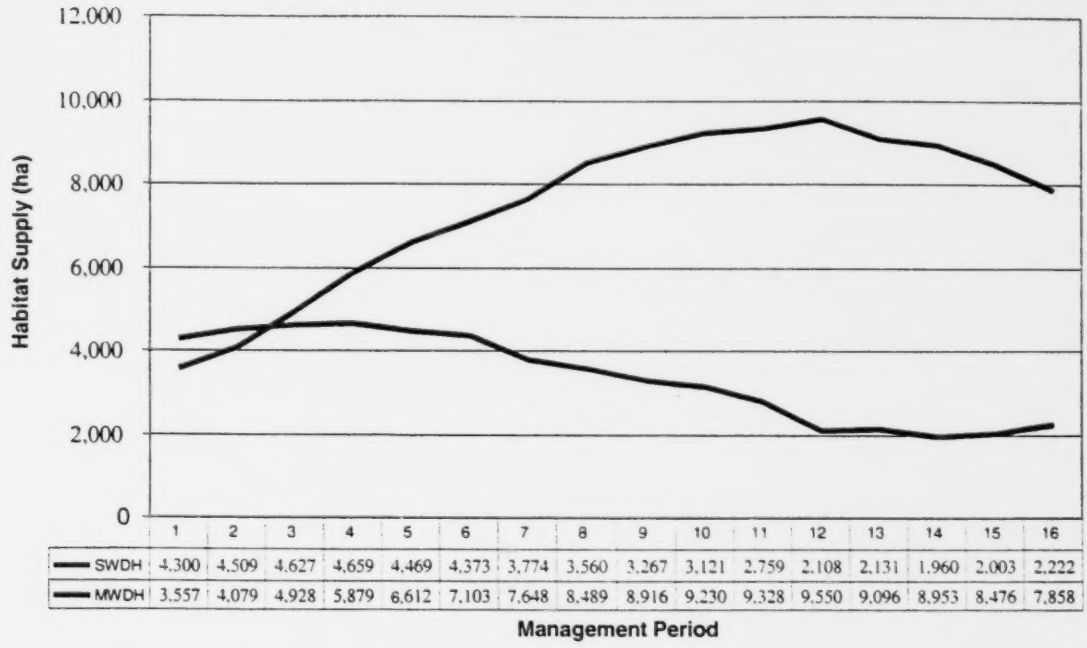
DNRE has established a policy and management requirement that designated areas (where there has been evidence of significant deer wintering activity) must be managed with a primary objective of maintaining or improving the long-term area of "deer wintering habitat". There are 76 designated DWAMUs located on the Fundy License, ranging in size from almost 4,000 hectares to less than 50 hectares. It is required that a Management Plan be developed and approved for each specific DWAMU prior to undertaking harvesting within the unit. Since 1997, J. D. Irving, Limited has worked to develop Management Plans for 50 of the 76 DWAMUs on the Fundy License. To date, 37 of these plans have been approved by DNRE, and an additional 13 deer yards have been cruised. This information is summarized in Appendix X..

Winter habitat is important to maintaining deer populations in New Brunswick. Deer experience conditions of cold and deep snow, which causes stress by limiting movement and the availability of food. Two habitat types have been identified as important to winter survival of deer: Moderate Winter Deer Habitat (MWDH) and Severe Winter Deer Habitat (SWDH). MWDH is provided by stands with high food value and at least some cover for thermal shelter. Deer access MWDH when snow and temperature conditions do no restrict mobility. SWDH is provided by dense softwood stands with better thermal cover value and some browse available. Deer use SWDH when deep snow and very cold temperatures limit access to other stand types. On the Fundy License, Moderate Winter Habitat is the primary habitat type due to the southern geographical location of the DWAMUs under active management. The objective is to maximize the sustainable supply of Moderate Winter Habitat while maintaining Severe Winter Habitat as high as possible.

The 80 year profile of winter deer habitat under a no harvest scenario is depicted in Figure 11. Over time, the severe habitat declines and the moderate habitat steadily increases, reaching it's peak in period 12 (9,550 hectares).

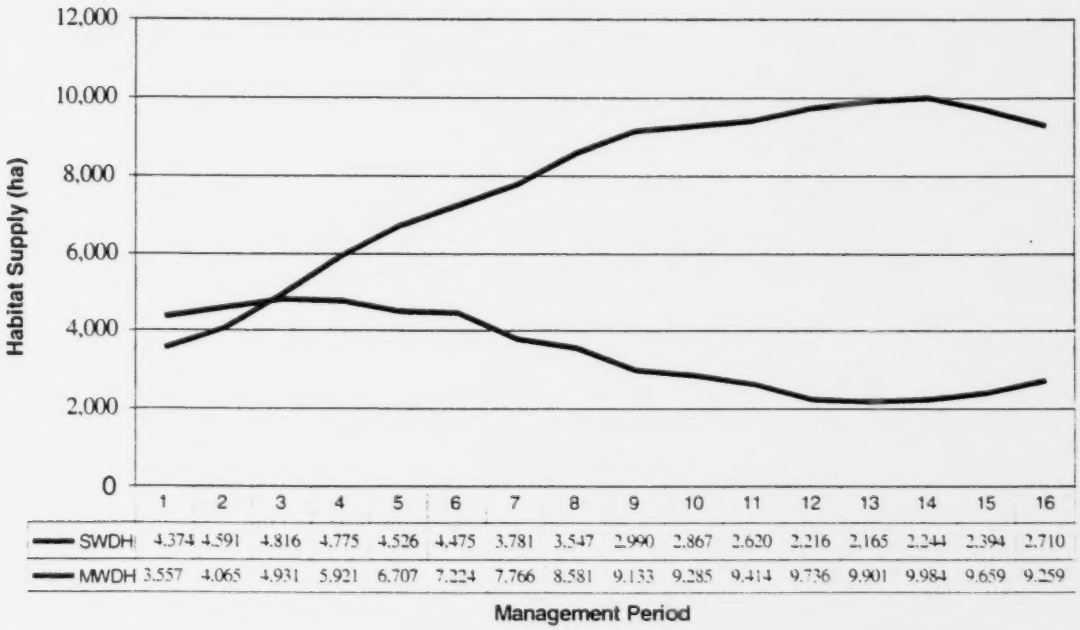
The 80 year non-spatial profile of winter deer habitat under a modest harvest strategy (greater than the harvest levels we have proposed), is depicted in Figure 12. In comparison to the no harvest scenario, both the Moderate and Severe Habitat levels improve. In fact, the Moderate Habitat is 19% higher at the end of the planning horizon with the proposed modest level of harvesting.

From Appendix X it is apparent that there has been a major focus of management activity within DWAMUs on the Fundy License during the 1997-2001 planning period. Based upon these recently completed plans, it is also apparent that there will be a significantly reduced level of harvesting activity within DWAMUs on the License during the 2002-2006 management period. Based upon the level of harvesting projected from the previously completed DWAMU plans, and estimating a level of activity within previously unmanaged DWAMUs (and allowing for a level of new information); we are projecting and proposing revised levels of harvesting activity as outlined in Table 15.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SWDH	4,300	4,509	4,627	4,659	4,469	4,373	3,774	3,560	3,267	3,121	2,759	2,108	2,131	1,960	2,003	2,222
MWDH	3,557	4,079	4,928	5,879	6,612	7,103	7,648	8,489	8,916	9,230	9,328	9,550	9,096	8,953	8,476	7,858

Figure 11. Projected Moderate (blue) and Severe (red) Winter Deer Habitat levels from the DWAMU Zone of the Fundy License without harvest interventions.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SWDH	4,374	4,591	4,816	4,775	4,526	4,475	3,781	3,547	2,990	2,867	2,620	2,216	2,165	2,244	2,394	2,710
MWDH	3,557	4,065	4,931	5,921	6,707	7,224	7,766	8,581	9,133	9,285	9,414	9,736	9,901	9,984	9,659	9,259

Figure 12. Projected Moderate (blue) and Severe (red) Winter Deer Habitat levels from the DWAMU Zone of the Fundy License with the planned level of harvest interventions.

Table 15. DWAMU harvest expectations by period on the Fundy License.

Period	Harvest Level				Silviculture Level	
	Sp/Fir/ JP m^3/period	Hardwood m^3/period	White Pine Sawlogs m^3/period	Cedar Saw Material m^3/period	Planting ha/period	PCT ha/period
1997-2001	35,500	26,100	2,500	0	227	404
2002-2006	16,000	15,200	1,000	0	90	570

Note: These volume estimates have been "netted down" to account for operational blocking issues and product yield expectations.

The proposed level of activity within DWAMUs during the 2002-2006 period, is based upon developing new plans for approximately 400 hectares of DWAMUs, and implementing "follow-up" plans for approximately 6,700 hectares of DWAMU. The specific DWAMUs we anticipate operating during the 2002-2006 period are summarized in Table 16.

Table 16. DWAMUs on the Fundy License planned for management plans and harvest activity during the 2002-2006 Period

DWAMU	Area (hectares)	Type of Plan
474602	290	Follow-up
474801	974	Follow-up
474802	184	Follow-up
484401	249	New
484801	308	Follow-up
486701	205	New
535001	2960	Follow-up
545101	215	Follow-up
545201	278	Follow-up
574801	1455	Follow-up
615101	334	Follow-up
624501	160	Follow-up

It should be noted that while we are committed to implementing Management Plans for at least 7,100 hectares of DWAMUs during the 2002-2006 period, the specific DWAMUs planned, may vary somewhat (due to on the ground conditions).

It is also important to note that there are 20 very small (less than 100 hectares in size) DWAMUs presently designated on the Fundy License. Under most circumstances, it is not our intent, nor is it operationally practical to develop a specific Management Plan for such small areas. We are willing to work with the DNRE staff to develop appropriate strategies and do appropriate harvest and silvicultural prescriptions within these very small Deer Wintering Areas. We believe that DNRE should develop alternative streamlined Management Plan requirements (in consultation with licensees) for very small (less than 100 hectares in size) DWAMUs.

Old Spruce-Fir Habitat Blocks

The New Brunswick DNRE has established "Old Spruce-Fir Habitat" (OSFH) objectives for each Crown License. These objectives are based upon the theoretical habitat requirements of the American Pine Marten and also provide for approximately 28 other dependant wildlife species. The minimum desired patch size for OSFH blocks is 375 hectares, with at least 75% of the block area meeting the OSFH criteria, and a normal block width exceeding 1,000 meters. OSFH blocks have been spatially identified for the next 35-years on each Crown License. Net OSFH objectives established by DNRE for eco-region on the Fundy License, are summarized in Table 17.

Table 17. Old Spruce-Fir Habitat objectives for each eco-region on the Fundy License.

Eco-region 3	Eco-region 4	Eco-region 5	Eco-region 6	Eco-region 7	License Total
2,320	2,220	5,820	6,960	3,040	20,360

Over the past several months, J. D. Irving, Limited staff have developed a data base and maps outlining stands on the License that meet the stand level criteria to provide OSFH habitat during periods over the next 35-years. DNRE staff and JDI foresters have reviewed this information, and have aggregated appropriate stands into OSFH blocks. After further analysis and several iterations, JDI staff have designated 25 OSFH blocks on the Fundy License. These blocks have been reviewed and approved by DNRE staff.

An area summary of the designated OSFH blocks is shown in Table 18 (for more detailed information refer to Appendix XI). In reviewing the summarized information, the designated OSFH blocks achieve the DNRE license objectives of the 20,360 hectares with the exception of the first period. During 2002-2006, our designated blocks account for 17,853 hectares of Old Spruce/Fir habitat, 2,742 hectares short of the DNRE objective. It is also important to note that the OSFH objective for each eco-region has not necessarily been achieved in each period. Specifically, the targets have not been met in each period for eco-regions 3 and 6 (this information is clearly summarized in Table 18). DNRE staff have carefully reviewed these areas and have approved the designated OSFH blocks, and accepted the indicated and noted shortfalls.

The data also indicates that for several of the designated OSFH blocks, the "habitat percentages" are lower than the desired 75% level. This is not surprising, as it is evident from our map analysis, that large consolidated areas of old spruce/fir habitat meeting DNRE's habitat criteria do not presently exist on the Fundy License. It should be noted that this lack of old spruce/fir habitat was also an issue in the 1993 and 1997 Management Plans. In fact, DNRE set a smaller block size objective for the Fundy License at that time, in light of the fact that there is no significant American Pine Marten population in southern New Brunswick.

Table 18. Area summary of Old Spruce-Fir Blocks on the Fundy License.

ELC Region	Block #	Periods in Effect		Total Hectares	Hectares of Habitat by Period						
		Start	Stop		1	2	3	4	5	6	7
03	MC576001	1	7	143	83	83	97	97	99	100	104
03	MC605801	1	7	238	62	96	99	107	123	142	146
	Total			**381**	**146**	**180**	**196**	**204**	**222**	**241**	**249**
04	MC486501	2	7	1,704		1,020	1,129	1,200	1,245	1,257	1,296
04	MC576001	1	7	1,019	741	787	833	835	847	899	910
04	MC596001	1	6	2,454	1,822	1,894	1,933	2,045	2,046	2,050	
04	MC605801	1	7	1,620	1,286	1,419	1,440	1,482	1,514	1,501	1,458
	Total			**6,797**	**3,849**	**5,120**	**5,335**	**5,562**	**5,652**	**5,707**	**3,664**
05	MC466302	1	7	382	235	252	255	270	312	312	323
05	MC474501	1	7	1,171	717	787	842	869	845	847	847
05	MC474601	1	2	805	597	634					
05	MC474801	1	7	778	526	558	580	588	588	588	588
05	MC476301	1	6	1,020	646	650	699	746	755	754	
05	MC486101	1	6	1,517	998	1,053	1,075	1,117	1,132	1,129	
05	MC486201	1	7	1,696	1,046	1,097	1,131	1,162	1,186	1,187	1,191
05	MC486501	2	7	1,215		873	980	997	1,016	1,024	1,031
05	MC494601	1	7	4,573	3,194	3,516	3,576	3,695	3,768	3,763	3,763
	Total			**13,156**	**7,960**	**9,420**	**9,138**	**9,443**	**9,602**	**9,605**	**7,744**
06	MC574601	1	4	1,002	582	622	622	720			
06	MC584501	7	7	1,059							731
06	MC584601	1	3	444	374	374	374				
06	MC584601	4	7	2,315	1,316	1,361	1,468	1,652	1,686	1,776	1,814
06	MC594501	7	7	4,662							2,916
06	MC594502	5	7	615					379	446	461
06	MC635001	1	3	642	450	458	477				
	Total			**10,739**	**2,722**	**2,815**	**2,941**	**2,372**	**2,065**	**2,222**	**5,923**
07	MC484801	1	7	2,348	1666	1673	1774	1781	1784	1786	1786
07	MC504701	1	7	1,281	837	900	995	1014	1014	1021	1025
07	MC504801	1	2	527	307	309					
07	MC504801	1	7	491	366	373	384	384	401	402	402
	Total			**4,646**	**3,176**	**3,256**	**3,153**	**3,179**	**3,199**	**3,210**	**3,213**
	License Total			**35,720**	**17,853**	**20,790**	**20,762**	**20,760**	**20,740**	**20,985**	**20,793**

Additional stands providing suitable OSFH also exist throughout the Fundy License. A summary of the total OSFH within each zone on the License forecasted for the next 35-years, according to this Management Plan, is shown in Table 19.

At the non-spatial proposal stage, a long term "Gross OSFH Objective" of 54,972 hectares was established for the Fundy License. As shown in Table 19, this level is achieved throughout the 25 year Management Plan. Our management strategy for the Fundy License will ensure that at least 54,972 hectares of Gross OSFH habitat is maintained throughout the 80 year planning horizon.

Table 19. OLDSF habitat levels reported in Hectares by period in each management zone for the Fundy License.

Period (years)	Protected Areas	Unique Areas	DWAMUs Area	Watercourse Buffers Area	General Forest Area	Net OSFH Blocks	Total gross habitat*
2002-2006	10,496	909	8,040	10,279	41,483	17,853	89,061
2007-2011	12,510	952	8,425	11,042	36,886	20,790	90,606
2012-2016	14,154	1,094	9,033	11,909	29,498	20,762	86,449
2017-2021	16,457	1,171	9,545	12,490	26,561	20,760	86,986
2022-2026	18,264	1,227	10,074	12,975	25,732	20,740	89,012
2027-2031	20,010	1,257	10,520	13,607	25,800	20,985	92,180
2032-2036	20,906	1,273	11,048	14,313	26,653	20,793	94,986

* Areas are mutually exclusive (areas are tallied in order of protection priority)

Harvesting within OSFH blocks is outlined for two different situations:

- within specific stands that are not required to provide Old Spruce/Fir Habitat; and
- within OSFH stands, without compromising their ability to provide Old Spruce/Fir habitat.

Different objectives and a different strategy are implemented for each of these situations:

- Within each designated OSFH block are stands that never did, or are no longer suitable to provide Old Spruce/Fir Habitat. These stands are planned to be accessed and harvested using an appropriate harvest prescription.
- Those stands within OSFH blocks that are providing habitat, or are planned to provide Old Spruce/Fir Habitat in the future, may undergo some harvesting, provided that the post-treatment attributes of the stand still meet the Old Spruce/Fir Habitat requirements. Depending upon the specific stand characteristics, shelterwood, commercial thinning, salvage harvests, single tree selection, or group selection prescriptions may be acceptable and appropriate.

Several analyses were undertaken on the OSFH land base to determine a proposed AAC from the land base. We have "netted-down" the analyses results significantly, and have proposed harvest levels, as summarized in Table 20.

It is important to note, accept, and approve that in order to derive the harvest levels proposed from Old Spruce/Fir Blocks, it will be necessary to build roads within these OSFH blocks. Without the acceptance and approval to build roads to access eligible stands, it will not be possible to derive the expected AAC from the OSFH blocks.

Since the initial submission of our Management Plan in April 2001; DNRE has revised its

policies and procedures for operating in Old Spruce/Fir blocks (Mr. Reid's letter of July 4, 2001). Based upon that change, and assuming agreement from DNRE field staff that our strategy and proposed harvest levels are reasonable and achievable; we have increased our planned spruce/fir harvest level from these areas by 1,000 m3/year. These revised levels are indicated in Table 20.

Table 20. Proposed harvest levels within OSFH Blocks on the Fundy License (after "Operational" Net downs).

	Harvest Level				Silviculture Level	
Stands/Period (2002-2026)	SP/Fir/ JP m^3/year	Hardwood m^3/year	White Pine Saw Logs m^3/year	Cedar Saw Material m^3/year	Planting ha/year	Pre-commercial Thinning ha/year
Non-OLDSF Habitat Stands	1,800	2,500	150	75	15	20
OLDSF Habitat Stands	3,200	500	50	50	0	0
Total OLDSF Habitat Blocks	5,000	3,000	200	125	15	20

As per the request of DNRE, we have done further analyses to review the OSFH levels at year 2052 on the Fundy License. We have prepared a map outlining the location of OSFH stands at year 2052 under the proposed Management Plan for the License. This map also highlights the eco-regions along with the designated OSFH blocks for the period from 2002 to 2037. In reviewing the location of future OSFH stands, it is readily apparent that the opportunity to group stands into suitable OSFH blocks quickly improves after 2037. A map showing this information (OSFH stands at 2037, 2042, 2047, and 2052), as well as a map showing OSFH stands if all harvesting on the License stopped after 2002) is included in Appendix XII. From these analyses, we have concluded that the availability of suitable OSFH block in the long term (35 to 50 years in the future) significantly improves with our Management Plan for the Fundy License.

As already noted, we do have major concerns about the present OSFH criteria and objectives. We feel it is most important that DNRE (in consultation with Licensees) review and revise these OSFH criteria and objective. We believe that there are major opportunities and there is a strong scientific rationale for revising the Old Spruce/Fir habitat definitions. We believe that there is a strong scientific rationale for revising the Old Spruce/Fir habitat definitions. We also recommend that DNRE review that rationale and basis for setting the net OSFH levels for each eco-region.

Watercourse and Highway Buffer Zones

Special management zones along each side of all watercourses are a requirement. In addition, DNRE has required that approximately 442 hectares along major highways be buffered for aesthetic purposes. These buffer zones are managed with a primary objective of protecting water quality and providing wildlife habitat, travel and connectivity corridors, or aesthetic buffers. Specifically, there is a "no tracking zone" within 15 meters of any watercourse, with a channel width greater than 0.5 meters. The remainder of the zone is managed in an effort to provide long term crown closure within the zone. Depending upon the particular stand conditions, a variety of harvest prescriptions might be utilized. Except in extenuating circumstances, large openings would not be created within watercourse buffer zones. Single tree selection, group selection, or salvage operations would most often be prescribed; however, some shelterwood harvests or small patch cuts might be utilized in specific stand conditions.

A summary of the area within mapped watercourse buffer zones is outlined in Table 21.

Table 21. Width and area of productive forest buffered on the Fundy License.

	Buffer Width	Total Area Buffered (ha)	Productive Forest Area Buffered (ha)
Buffered Highways	60 m	442	280
Single Line (Streams)	60 m	47,652	37,411
Double Line Streams	85 m		
Rivers	110 m		
Lakes	100 m		
Total Buffers		48,094	37,691

As noted in Table 21, 48,094 hectares, or almost 12% of the Fundy License land base is located within designated buffer zones. It is important to note that in addition to mapped watercourses there are also significant buffer areas required for unmapped streams. These unmapped streams do not always require or receive 60 meter buffers; however, in order to ensure that there is no risk of erosion, even intermittent streams require three-meter no tracking zones. From our experience, we estimate that 4% of our harvest block area is constrained by buffer zones for previously unmapped streams. In order to account for unmapped streams, we have "netted down" our expected harvests by an additional 3% (these net downs are reflected in the AAC figures presented in this document).

Our management strategy for the watercourse buffer zone is to prescribe an initial harvest intervention into mature or over mature stands, within the next 25-years. It is intended that this zone may be operated (pre-operated) completely independently of adjacent harvest blocks in the General Forest Zone. Due to difficulties of access and logistical

constraints, in our original April 2001 Management Plan submission we only planned that approximately 50% of the watercourse buffers would actually be entered. Using broad averages, we estimated that the removal level will be less than 40 m3/ha (modeled as 32 m^3/ha removal all species) outside the 15 meter no tracking zone. We believe that 70% of the volume removed will be spruce/fir/jack pine. .

Since our initial April 2001 Management Plan submission, DNRE has revised the policies and procedures to apply for and carry out operations within Watercourse Buffer Zones (Mr. Reid's letter of July 4, 2001 and Mr. Volpes letter of December 3, 2001). Based upon these interpretations, we have significantly revised our proposed level of activity within Watercourse Buffer Zones. A summary of our revised proposed harvest levels by species groups for the next 25-years is outlined in Table 22.

Table 22. Area and volume proposed for harvest (after "operational" net downs) within watercourse buffer zones on the Fundy License over 25-years.

Period (year)	Annual Harvest Area (ha)	Spruce/Fir/ Jack Pine m^3/year	Hardwood m^3/year	White Pine m^3/year	Cedar m^3/year
2002-2026	300	7,400	1,600	300	100

For the purposes of landscape level management planning, we will be prescribing relatively light harvesting prescriptions that we feel will not compromise or affect the stand's pre-treatment habitat or forest community characteristics.

Recreation

Recreation is another important use and management consideration on the Fundy License. While fishing and hunting are major recreational uses of the Crown License, there are also many other popular activities including:

- hiking,
- snowmobile or All Terrain Vehicle use,
- canoeing,
- bird watching,
- nature appreciation,
- plus numerous other outdoor pursuits.

J. D. Irving, Limited's staff have contacted and consulted with recreational groups, community groups, DNRE, our employees, and the general public in order to be aware of, and informed about recreational sites and uses on the Fundy License. We have made a formal note of many of these sites and much of this information has been incorporated into our GIS data base. We intend to update our knowledge about recreational areas on the License, on a continual basis.

Harvesting operations are not usually prohibited on recreational sites; and our intention is to manage these as multiple-use management areas. In specific situations where forest harvesting is not compatible with a recognized and designated recreational primary use objective, we have incorporated those sites into our "Unique Areas" program. We have not otherwise assumed there to be any AAC impact of managing for recreational use on the Fundy License.

WOOD SUPPLY AND HABITAT ANALYSES

Base Line Objectives

A primary objective on the Fundy License is to maximize the sustainable supplies of quality timber products while providing for non-timber values including maintenance of biodiversity and specific wildlife habitats, protection of water quality, preservation of unique and recreationally important areas, and facilitation of public input.

Specific objectives incorporated into our analysis for the General Forest Zone include:

- The annual harvest level for spruce/fir/Jack Pine will be sustainable (i.e., non-declining).
- The prescribed harvest levels for hardwood, White Pine and Cedar will be such that the long term potential of these species is not compromised.
- Harvest strategies will be focused upon the production of higher valued forest products.
- Quality tolerant hardwood or tolerant HS stands, and predominant Cedar stand types will be managed to retain their existing classification.
- Appropriate silviculture will be utilized to promote natural regeneration and ensure adequate stand level stocking to improve the growth, yield and quality of forest stands.
- Forest vegetation community types will be maintained by eco-region as identified in Table 23.
- A proportion of the land base must be maintained in "old forest" conditions meeting specific wildlife and habitat requirements.

Table 23. Vegetation community and wildlife objectives for the Fundy License.

Vegetation Community	Constraining Objective by Eco-region (ha)							
	3		4	5		6	7	
THP	1,940	3,720[4]	0	820	2,900[4]	0	0	1,410[4]
THSW	1,110		450	1,830		1,740	1,350	
SP	2,380		2,800	6,000		3110	2,160	
BS	0		0	1,540		5,590	1,660	
PINE	0		0	240		230	180	
JP	0		0	0		1130	0	
OHWH[1]	340		250	850			690	
OSFH[2]	2,320		2,220	5,820		6,960	3,040	
OMWH[3]	920		480	2,010		2,290	1,280	
LMWH[3]	180		90	390		460	250	

[1] *OHWH* – Overlaps with IHSW,THSW and THP; a separate habitat window will be applied to all eligible curves
[2] *OSFH* - Has spatial requirements and may contain any of SP,BF,BS,EC; a separate habitat window will be applied to all eligible curves
[3] *OMWH, LMWH* - May overlap with any/all vegetation communities except THP; a separate habitat window will be applied to all eligible curves
[4] Due to Habitat *OTHH* objective being higher, this total of THP + THSW must be maintained
[5] Due to Habitat *OPIH* objective

Management Planning Tools and Methodology

Forest management planning is a hierarchical process in which strategy precedes tactics in the same way that the plan itself must precede its implementation. At the highest level of the hierarchy, is the strategic planning phase. Its goal is to identify a long term (80 years or more), forest level set of treatment types, amounts and timing choices that will meet forest management objectives. This planning level utilizes strata or class based description of the forest and spatial detail is decidedly coarse.

The tactical level of planning has a much more geographically localized focus and a shorter planning horizon (25-years or less). In this planning phase, the chosen class based strategy is translated into a map based, site or stand specific harvest plan. The plan is implemented through a series of highly detailed, annual operating plans in which field staff may alter and adjust prescriptions and timing based on specific stand conditions.

The forest management planning process is also cyclical in nature. As information, objectives, tools and the land base itself change over time, management plans, both strategic and tactical, must be re-visited and adapted as well. Just as the tactical, map based harvest schedule is a sustainability check against the long term strategy; the modification of management plans at regular intervals gives some insurance against unforeseen circumstances or erroneous assumptions. The management planning process on New Brunswick crown land is repeated every five years.

The strategic phase of this management plan for the Fundy License was developed using the WoodStock® forest modeling system. Inputs to the model include:

- a current description of the forest derived from forest inventory data, (provided from the GIS data base)
- a set of harvest and silviculture treatment options and the rules for their application, and
- a quantitative prediction of how the forest will change over time with respect to feasible interventions.

Given these inputs and a particular set of objectives and constraints, the WoodStock® system uses linear programming to identify the optimal strategy and treatment schedule.

In addition to the WoodStock® modeling system, the following tools were utilized in preparing this management plan:

- Arc/Info geographic information system (GIS) in preparing the forest inventory data, storing the block plan in digital format, and in producing map products,

- Arc View desktop GIS in overall management of the database (querying, classifying, displaying), in editing of the block plan, and in producing map products,

- Stanley, a harvest block scheduling software package employed to select potential managed stands for harvest interventions.

- Staman stand growth and yield model in stratification and prediction of growth and yield over time,

- Numerous other software tools including Microsoft Excel, Access, Power Point and Word.

Data Sources and Methods

The land base for the Fundy License was characterized from the digital forest inventory maintained in a Geographical Information System (GIS) located in Saint John, New Brunswick. This inventory was initially developed from aerial photography (true color) at a scale of 1:12,500. The photo interpretation was verified on the ground by using a network of Forest Development Survey (FDS) plots. Compilation of the land base was completed as follows:

All "Special Management" Zones including: watercourse buffers, deer wintering area management units, unique areas and reserves, old spruce/fir habitat blocks, and the proposed protected areas were entered into the inventory data base. An intersection of the forest stands with these "Special Management" zones defines the area by stand type in the constrained and unconstrained forest.

Regular annual updates for harvesting and silviculture treatments were incorporated making the inventory current until the end of the 1998-operating year for harvesting, and the end of the 1999 operating year for silviculture.

The merchantable forest was characterized from the photo interpretation using development patterns and age distributions provided from the FDS data. JD Irving, Ltd. staff built local volume tables and stocking tables in the process of yield curve construction. The Staman model was employed to build the yield curves.

Commercial thinning of plantations and natural spaced stands were characterized using growth rates from the re-measurement of permanent sample plots (PSP's) in managed stands on the New Brunswick Crown lands.

Modeled Forest Area

As previously noted, the total area for Fundy License is 400,547 hectares. Eighty-nine percent of the area (355,421 hectares) is capable of growing trees. The remaining 11 percent of the land base is contained in wetlands, bogs, roads, old gravel pits, and water,

which have not been modeled.

The 355,421 hectares of productive land, has been sub-divided into management zones. To avoid double counting where restrictions overlap, these "Special Management" areas have been classified according to their primary management objective. Specific management objectives, associated strategies, and implementation issues for the individual forest zones is discussed below. Table 24 identifies the six forest zones by productive land. The General Forest Zone makes up 68 percent of the productive land base. The remaining 32 percent represent areas where the primary objective is non-timber driven.

Table 24. Productive forest zoning on the Fundy License.

Management Zones	Total Land Area (Exclusive)	Percent of Productive Forest Area (%)	Exclusive Productive Forest Area (hectares)
General Forest	271,859	68%	246,516
Protected Areas	41,270	10%	33,790
Unique Areas	7,490	2%	5,794
DWAMUs	23,230	6%	21,476
Old Spruce/Fir Habitat Blocks	24,104	6%	21,987
Watercourse/Highway Buffers	32,594	8%	25,860
Total	400,547	100%	355,422

Wood Supply Trade Off Involved in Strategy Choices

Using the information on forest condition, stand yields and treatments, a series of aspatial or class based analyses were conducted. The purpose of the analysis identified issues, opportunities and impacts influencing the Fundy Crown forest under a host of management alternatives. The intent of these analyses was to develop a strategy that satisfied all objectives for the land base over an 80 year time horizon. This section presents and discusses the results of these analyses, their implications to management of the Fundy License, and the reasoning behind the strategy chosen for implementation. Implementation issues associated with the chosen strategy are also discussed.

Benchmark Scenarios for the "General Forest Zone"

In order to select a chosen management strategy for the Fundy License, a series of more than 20 benchmark strategies were modeled and analyzed. The aspatial analyses were conducted using the WoodStock® forest modeling system. Forecasts are based on an 80 year time horizon in which year 2002 represents Year 1 of the forecast. Unless otherwise indicated, all AAC results in this section are reported for the General Forest Zone only (246,516 productive forest hectares). However, the entire forested land base does

contribute to the overall habitat and biodiversity objectives. Table 25 provides a description of several wood supply scenarios investigated to evaluate the forests performance with respect to meeting timber and vegetation community objectives established for the Fundy License.
Table 26 provides a comparison of several of the pertinent wood supply analyses conducted more runs just discussed.

Table 25. Aspatial benchmark analyses for the Fundy License.

Run	Brief Scenario Description
0.0	Do Nothing, With no harvesting and no silviculture - Watch the forest grow/decline over 80 years.
1.0	Max. Spruce/Fir, A basic Clear-cut scenario with the absence of Silviculture
4.0	Max. Spruce/Fir, In addition to Spruce/Fir/J Pine, even flow Intolerant Hardwood
5.0	Max. Spruce/Fir, Introduce Planting Only (percentage by species, Jp capped at 15%)
6.0	Max. Spruce/Fir, Introduce Pre-commercial Thinning (Pct) Only
7.0	Max. Spruce/Fir, Combine Planting and Pct
11.0	Max. Spruce/Fir, Capping the Harvest prescriptions levels according to operational guidelines
13.0	Max. Spruce/Fir, Trying to meet the Biodiversity levels
16.0	Max. Spruce/Fir, Relax the flow of Intolerant Hardwood to achieve the Biodiversity levels
17.0	Max. Spruce/Fir, Include 2000/2001 Harvest and silviculture levels in the first period
18.0	Reduce the Spruce/Fir/J Pine AAC in order to maximize piece size and minimize the pulp product

*spruce/fir/Jack Pine = sfj

Table 26. Results from the aspatial wood supply analyses.

Run	Spruce/Fir/Jack Pine m^3/year	Planting ha/year	Pre-commercial Thinning ha/year
0.0	0	0	0
1.0	212,000	0	0
3.0	306,000	0	0
4.0	291,000	0	0
5.0	390,000	700	0
6.0	382,000	0	700
7.0	483,000	1,000	1,900
11.0	470,000	1,500	2,400
13.0	446,000	1,300	2,400
16.0	468,000	1,500	2,200
17.0	468,000	1,500	2,200
18.0	398,000	1,300	1,965

The very first model run (0.0) investigated the long-term stability of the forest under a no harvest, no silviculture scenario. In other words, do nothing and watch how the forest's growing stock changes over the next 80-years.

The results of run 0.0 are very interesting because the increase in growing stock trend is different from previous analyses. In previous analyses, the growing stock decreased in the first 25-years of the planning horizon, then steadily increased as plantations and pre-commercial thinning became operable. However, in the current analysis the softwood growing stock indicates a strong positive net growth due to the following factors.

- Over the past fifteen years, older stands were harvested to minimize volume loss due to mortality,

- The remaining forest is younger, healthier, and exhibiting a net positive growth, and

Recently collected FDS plot data, and re-measurements in Permanent Sample Plots has confirmed these trends, and resulted in revised increased growth and yield forecasts.

Run 1.0 establishes a 'harvest only' bench mark scenario, by harvesting operable stands and not doing any follow-up intensive silviculture treatments (planting or thinning). The net result was an 80 year harvest rate of 306,000 m^3/year of spruce/fir/Jack Pine (SFJ). The primary objective was to maximize SFJ on an even flow basis. By constraining this scenario with an even flow objective for intolerant hardwood the SFJ AAC decreases to 291,000 m^3/year (Run 4.0)

The subsequent runs (5.0 and 6.0) were directed to investigate the impact of silviculture. The present forest structure of the Fundy License provides an opportunity to increase the AAC with silviculture. In Run 5.0, 700 hectares/year were planted (the Jack Pine planting level was capped at 15 percent) in order to sustain a SFJ AAC of 390,000 m3/year. With no tree planting, Run 6.0 introduced a pre-commercial thinning program of 700 hectares/year, which maintained the SFJ AAC at 382,000 m^3/year.

A combination of planting 1,000 hectares/year and pre-commercially thinning 1,900 hectares/year yields an 80 year harvest rate of 483,000 m^3/year (Run 7.0). The increase in growing stock also clearly demonstrates an opportunity to increase the long term AAC, 30 to 40 -years in the future.

The next step in the wood supply analysis was to incorporate local field knowledge (with respect to harvest prescriptions). Our foresters assigned appropriate prescriptions to each forest community type. There is an opportunity for multiple entry harvest without a large negative effect on the AAC. This has been demonstrated in Run 11. Setting the harvest prescription levels according to operational guidelines (i.e. not favoring clear cutting) the AAC is 470,000 m^3/year. Run 11 was based on planting 1,500 hectares/year and pre-commercial thinning 2,400 hectares/year.

When biodiversity objectives were introduced into the analysis; the net result of maintaining the forest vegetation communities and habitat levels reduces the SFJ AAC to 468,000 m^3/year (Run 16.0), although not all diversity targets were achievable. It should be noted that the AAC is calculated from the General Forest Zone only, but the vegetative and habitat levels include the entire license area.

Run 17.0 accounts for harvesting and silviculture in 2000/2001, in order to establish 2002 as the starting point for period 1. The AAC remained the same as the previous run.

In an effort to improve the long term harvested piece size, and the saw material product yield for spruce/fir/Jack Pine; we did a further analysis (Run 18.0). This run reduced the Spruce/Fir/Jack Pine AAC (by 15% compared to Run 17.0) to 398,000 m^3/year, however it provided a significantly improved harvested piece size.

Upon review of our proposal, DNRE requested that J.D. Irving, Ltd. adjust the management strategy for the Fundy License to a plan that maintained the spruce/fir/Jack Pine AAC at (or above) the 1997 Management Plan Levels. In addition several minor adjustments and corrections have been made to our original (September, 2000) proposal submission. Some of the key indicators related to the Aspatial Baseline are summarized in the following tables (Table 27 and Table 28).

Table 27. Summary of the proposed harvest levels in the General Forest Zone of the Fundy License under the aspatial baseline analysis.

PERIOD	PROPOSED HARVEST LEVEL - m^3 per year				
	Spruce/Fir/Jack Pine	Hardwood	White Pine	Cedar	Total
2002-2006	398,000	295,883	11,160	13,759	718,802
2007-2011	398,000	252,851	10,854	10,173	671,877
2012-2016	398,000	247,196	11,203	10,843	667,242
2017-2021	398,000	190,929	13,916	9,860	612,705
2022-2026	398,000	166,389	10,606	5,013	580,009
2002-2026 Average	398,000	230,000	11,548	9,930	650,127

Table 28. Summary of proposed silviculture program for the General Forest Zone on the Fundy License from the aspatial baseline analysis.

Period	Proposed Silviculture Levels - Hectares Per Year			
	Tree Planting	Pre-Commercial Thinning		
		Softwood	Mixed Wood	Hardwood
2002-2006	1,500	935	477	72
2007-2011	1,390	908	417	93
2012-2016	1,260	1,606	482	84
2017-2021	990	1,747	470	158
2022-2026	1,430	1,639	483	261
2002-2026 Average	1,300	1,367	465	133

It is important to note that the theoretical results modeled in the aspatial model run for the General Forest Zone must be spatially netted down in order to account for:

- operational blocking constraints,
- low volume inoperable stands,
- unmapped streams and sensitive areas,
- leaving stand remnants and providing structural and biological diversity, and
- product yield adjustments for certain species/products.

The theoretical analyses have assumed an optimum scheduling for each and every stand on the license. Operationally, it is neither possible nor practical to access and operate every stand in this manner. It has been our experience that the conservative net down to account for operational blocking constraints is approximately 15%. We are therefore proposing that a 15% net down be assumed for this constraint.

There are some forests stands that due to their low volumes will be deemed inoperable when adjacent stands are harvested. We are estimating that a net down of 5% will adequately account for inoperable stands that will not be harvested within the next 25-years.

There are numerous unmapped streams that occur within operating blocks. Depending upon the width and drainage of these features, they also require buffers varying from 5 to 60 meters. We sampled several recent harvest blocks to determine the extent and wood supply impact of unmapped streams. Our survey revealed that approximately 4% of the blocked area occur within buffers on unmapped streams. Some level of light harvesting is acceptable and appropriate within these buffer zones, however we are assuming and proposing that a further net down of approximately 3%, be applied for unmapped stream buffers.

Our clear-cut harvest prescriptions (variable retention and over story removal) no longer remove all merchantable stems on the harvest block. In order to maintain structural and

biological diversity within the area, we have established BMPs that require retention of legacy trees, stand remnants, cavity and wildlife trees, clumps, islands, and other important features that provide structural and biological diversity. We are estimating that, on average, approximately 3% of the total block volume will be maintained post-harvest entry for these purposes. It is important to note; however, that certain species (Cedar, Hemlock, pine and hardwood) will be favored for retention.

The AAC of several species including White Pine and Cedar must be substantially adjusted in order to account for cull volume and the expected yield of specific high grade products. In order to determine the availability and AAC for White Pine saw logs, we are assuming that 75% of the total merchantable volume will be saw log grade. Currently there is a high cull factor and no market for pulp grade Cedar. We have utilized a 50% net down for Cedar saw material.

It is important to note that all of these net downs, with the exception of the Operational Blocking constraints, also apply to the blocked Management Plan. This means that the computer analysis results should be further reduced by 9% for spruce/fir/Jack Pine, 13% for hardwood, 35% for White Pine, and 57% for Cedar in order to account for these real operational net downs. The AAC summary tables presented later in this Management Plan document have had these operational net downs applied.

Table 29 summarizes the specific "operational net downs" that we have utilized in this Management Plan for each species group.

Table 29. Operational net down percentages utilized in the Fundy License Management Plan.

Reasons for "Net Down"	Net Down Percentage			
	Spruce/Fir /Jack Pine	Hardwood	White Pine Saw logs	Cedar Saw Material
Operational Blocking Constraints	15%	15%	15%	15%
Low Volume Inoperable Stands	5%	5%	5%	5%
Unmapped Streams	3%	4%	4%	4%
Structural and Biological Diversity	2%	5%	5%	5%
Product Yield Adjustment Factors	0%	0%	25%	50%
Total Net Down before Blocking	23%	27%	45%	63%
Total Net Down after Blocking	9%	13%	35%	57%

THE BLOCKED MANAGEMENT PLAN

Based upon our aspatial baseline analysis and initial proposal (September, 2000); we developed a Management Plan for the Fundy License to meet the objectives outlined in DNRE's March 2000 document: "A Vision for New Brunswick Forests . . . Goals and Objectives for Crown Land Management." This plan was submitted for DNRE review and comment in April 2001. Based upon comments received we have further revised our Management Plan.

Our revised "blocked" Management Plan outlined the intended harvest areas, prescriptions, and treatment schedule for the 25-year period 2002-2026 on the Fundy License. The specific blocking was done by our field forestry staff who normally plan and supervise the implementation of these operations on-the-ground.

In order to achieve a strategy that met all DNRE's objectives and obligations, yet optimized operational issues and concerns, more than ten blocking iterations were required. J.D. Irving, Ltd. staff have undertaken detailed analysis of the interim harvest blocking results, and have provided valuable feedback, to develop this blocked Management Plan. We believe that the management plan we have proposed for the Fundy License is the best strategy to meet DNRE's stated objectives for Crown land management.

Table 30, shows the prescriptions and area outlined for harvest over the next 25-years within the General Forest Zone on the Fundy License. Clear-cut prescriptions will be utilized on 60% of the area within the first period. This level will drop to less than 40% in by year 2017.

Tables 31, 32, 33 and 34 summarize the blocked harvest volume from spruce/fir/Jack Pine, Hardwood, White Pine, and Cedar (respectively) from the General Forest Zone for the Fundy License (For additional information see Appendix XIII). A summary of the area harvested by forest community type is shown in Appendix XIV.

Table 30. Proposed harvest area Summary for the General Forest Zone (only) on the Fundy License.

Period	Total Harvests		Natural Stands						Managed Stands	
	All Prescriptions		Variable Retention	Over story Removal	Shelter wood	Patch #2	Single Tree/Group Selection	Patch #3	Variable Retention	Commercial Thin
	ha	%	%	%	%	%	%	%	%	%
1	33,933	100	56	4	10	10	13	7	0	0
2	39,274	100	40	2	4	13	11	9	0	21
3	33,956	100	41	1	10	28	1	9	2	8
4	37,733	100	20	0	4	19	3	11	5	38
5	35,407	100	18	0	2	15	18	9	19	19
Total	180,303	100	37	1	6	16	10	9	5	16

Table 31. Spatially proposed spruce/fir/jack pine harvest volumes for the General Forest Zone (only) on the Fundy License.

Period	Total Harvest			Natural Stands						Managed Stands	
	All prescriptions (Gross)	Netted Down		Variable Retention	Over story Removal	Shelter wood	Patch #2	Single Tree/Group Selection	Patch #3	Variable Retention	Commercial Thin
	m^3	m^3	%	%	%	%	%	%	%	%	%
1	1,811,968	1,648,890	100%	79	6	6	5	2	2	0	0
2	1,733,395	1,577,390	100%	68	3	3	6	2	3	0	15
3	1,770,077	1,610,770	100%	52	1	13	21	0	3	5	5
4	1,769,545	1,610,286	100%	31	0	5	16	0	3	17	28
5	1,915,751	1,743,333	100%	19	0	2	11	3	4	51	10
Total	9,000,736	8,190,669	100%	52	2	6	11	2	3	14	10
AAC	360,029	328,000	100%								

Table 32. Spatially proposed hardwood harvest volumes for the General Forest Zone (only) on the Fundy License.

Period	Total Harvest			Natural Stands						Managed Stands	
	All prescriptions (Gross)	Netted Down		Variable Retention	Over story Removal	Shelter wood	Patch #2	Single Tree/Group Selection	Patch #3	Variable Retention	Commercial Thin
	m^3	m^3	%	%	%	%	%	%	%	%	%
1	1,096,374	953,845	100%	68	4	4	6	13	5	0	0
2	1,139,141	991,053	100%	62	3	2	9	13	10	0	1
3	1,198,341	1,042,557	100%	66	1	5	19	1	7	1	0
4	919,640	800,086	100%	44	1	4	21	6	18	2	4
5	1,001,795	880,261	100%	41	0	1	15	26	10	4	3
Total	5,355,291	4,667,803	100%	59	2	3	13	12	9	1	1
AAC*1	228,924	199,000	100%								

*1 The Hardwood AAC is calculated from 2002-2016

Table 33. Spatially proposed White Pine harvest volumes for the General Forest Zone (only) on the Fundy License.

Period	Total Harvest			Natural Stands						Managed Stands	
	All prescriptions (Gross)	Netted Down Saw Logs		Variable Retention	Over story Removal	Shelter wood	Patch #2	Single Tree/Group Selection	Patch #3	Variable Retention	Commercial Thin
	m^3	m^3	%	%	%	%	%	%	%	%	%
1	71,592	46,534	100%	83	3	9	3	0	2	0	0
2	70,188	45,622	100%	81	2	7	2	0	2	0	6
3	81,603	53,041	100%	58	0	17	19	0	2	1	3
4	84,151	54,698	100%	29	0	32	14	0	1	1	23
5	83,555	54,310	100%	24	0	38	13	0	1	9	15
Total	391,089	254,205	100%	56	1	20	10	0	2	2	9
AAC	15,644	10,200	100%								

Table 34. Spatially proposed Cedar Saw material harvest volumes for the General Forest Zone (only) on the Fundy License.

	Total Harvest			Natural Stands						Managed Stands	
Period	All prescriptions (Gross)	Netted Down Saw Material		Variable Retention	Over story Removal	Shelter wood	Patch #2	Single Tree/Group Selection	Patch #3	Variable Retention	Commercial Thin
	m^3	m^3	%	%	%	%	%	%	%	%	%
1	59,203	25,457	100%	87	4	2	1	4	2	0	0
2	55,631	23,921	100%	89	2	2	0	5	2	0	0
3	62,250	26,767	100%	56	1	17	21	2	3	0	0
4	35,410	15,263	100%	66	0	8	22	1	3	0	0
5	24,032	10,333	100%	53	0	3	30	5	9	0	0
Total	236,526	101,741	100%	76	2	6	10	3	3	0	0
AAC	9,461	4,100	100%								

A summary of the harvest area and volumes by DNRE Region is also shown in Appendix XIII

It is important to note that, while we have blocked a 25-year Management Plan for the Fundy License; we will be reviewing each and every harvest area in more detail at the Operating Plan level. The more detailed annual review will undoubtedly lead to changes and adjustments, based upon stand, block level and operations conditions at the time, None-the-less, we believe the License level harvest area and volume by prescription forecasts are realistic, reasonable and achievable. However, some flexibility at the Operating Plan level is critical, and is expected.

Subsequent to the submission of our initial blocked 2002-2026 Management Plan in April 2001; DNRE has revised its opening size and adjacency policy (Mr. Volpe's letter of December 3, 2001). As a result of this change, we believe that the net long term impact will be a very slight AAC increase. Conservatively, we have increased the spruce/fir/jack pine AAC by 1,000 m3/year to account for this change. It should be noted that this volume is not included in the model run, nor in Tables 31-34

LICENSE LEVEL INDICATORS

AAC Level

Our Management Plan for the Fundy License provides a spruce/fir/Jack Pine AAC of 348,300 m^3/year. This represents a 2% increase above the 1997 plan level. It will be possible to increase this level by approximately 20% after 2050.

Our analyses indicate that a long-term hardwood AAC of 180,000 m^3/year is sustainable. Our Plan outlines harvesting approximately 16% above that level to 208,600 m^3/year for the period 2002-2016 and then reducing the harvest to a long term sustainable level of 175,000 m^3/year (this long-term level is still 5% above the 1997 Management Plan level). We feel that this is a reasonable and responsible strategy because it avoids the alternative of doing partial removal prescriptions, or delaying important silvicultural prescriptions in pure hardwood stands. We are confident that we can maintain the availability of hardwood high-grade products from the License, in spite of the slight reduction in hardwood harvest level after 2016.

A sustainable yield of approximately 11,100 m^3/year of White Pine saw logs is possible from the License, according to our Management Plan. In the long term, a flow of 2,500 m^3/year of Cedar saw material could be sustained from the land base. In the short term however, an average 4,400 m^3/year of Cedar saw material "falls out" of the blocked Management Plan over the next 5 years.

The total planned harvest levels by zone for the 2002-2005 and the 2002-2026 planning periods are summarized in Table 35.

Table 35. Harvest levels on the Fundy License for the 2002-2026 management plan period.

Forest Zone	Harvest Levels (m^3/year)			
	Spruce/Fir/Jack Pine	Hardwood	White Pine Saw Logs	Cedar Saw Material
General Forest				
2002-2016	329,000	199,000	10,200	4,100
2017-2026	329,000	168,000	10,200	4,100
Protected Areas				
2002-2006	3,300	1,900	100	100
2007-2011	1,300	900	100	100
Unique Areas				
2002-2026	400	100	100	0
DWAMUs				
2002-2026	3,200	3,000	200	0
OLDSF Blocks				
2002-2026	5,000	3,000	200	100
Watercourse Buffers				
2002-2026	7,400	1,600	300	100
Total License				
2002-2006	348,300	208,600	11,100	4,400
2007-2011	346,300	207,600	11,100	4,400
2012-2016	345,000	206,700	11,000	4,300
2017-2021	345,000	175,700	11,000	4,300
2022-2026	345,000	175,700	11,000	4,300

In addition, our Management Plan will provide "fall out" volumes of several minor species. These include Red Pine, Hemlock, Tamarack, and White Pine pulpwood. Table 36 summarizes the expected availability of these species/products for the 2002-2026 planning period.

Table 36. Fallout Volumes of Minor Species/Products from the 2002-2026 Fundy License Management Plan (revised February 2002).

Period	Fall Out Volume Availability - m^3/year				
	Red Pine	Hemlock	Tamarack	White Pine Pulpwood	Total
2002-2006	1,005	2,452	5,712	3,700	12,869
2007-2011	1,684	1,975	5,203	3,700	12,562
2012-2016	1,033	2,336	4,992	3,700	12,061
2017-2021	1,607	1,445	2,861	3,700	9.613
2022-2026	3,570	1,074	2,228	3,700	10,572
Average AAC 2002-2026	1,780	1,856	4,199	3,700	11,535

Silviculture Levels

A commitment on behalf of both J.D. Irving Ltd. and DNRE, to undertake an aggressive silviculture program is necessary and fundamental to ensure that the indicated AAC's are sustainable in the long-term. In total, a planting level of 1,447 hectares/year and a pre-commercial thinning level of 2,027 hectares/year must be maintained on the license. This level is approximately 11% less than the level outlined in the 1997 Fundy License Management Plan. The silvicultural requirement by zone is summarized in Table 37.

Table 37. Required silviculture levels on the Fundy License for the 2002-2026 management plan period.

Forest Zone	Proposed Silviculture Level (hectares/year)				
	Planting	Pre-commercial Thinning			
		Softwood	Mixedwood	Hardwood	Total
General Forest	1,422	1,143	470	302	1,915
Proposed Protected Areas	0	0	0	0	0
Unique Areas/Reserves	0	0	0	0	0
DWAMUs	10	82	5	5	92
OLDSF Blocks	15	20	0	0	20
Watercourse Buffers	0	0	0	0	0
Total License	1,447	1,245	475	307	2,027

A comparison of the 1993, 1997, and 2002 harvest and silviculture levels is summarized in Table 38.

Table 38. Comparison of 1993, 1997 and proposed 2002 Fundy License management plan harvesting and silviculture levels.

Management Plan	Harvest Levels (m3/yr)				Silviculture Program (ha/yr)	
	Spruce/Fir /Jack Pine	Hardwood	White Pine Sawlogs	Cedar Highgrade Products	Planting	Pre-commercial Thinning
1993	285,000	116,000	20,250	4,000	1,100	1,280
1997	340,500	167,300	11,300	5,800	1,175	2,745
2000 September Proposal	324,300	180,650	6,850	2,990	1,325	2,085
April 2001 Submission	340,500	207,800	10,850	4,625	1,415	2,042
January 2002 Management Plan	348,300	208,600	11,100	4,400	1,447	2,027

Harvest Piece Size and Product Yield

The expected harvested piece size (m^3/tree) distribution and product yields for both softwood and hardwood according to this Management Plan, is depicted in Figures 13 and Figure 14.

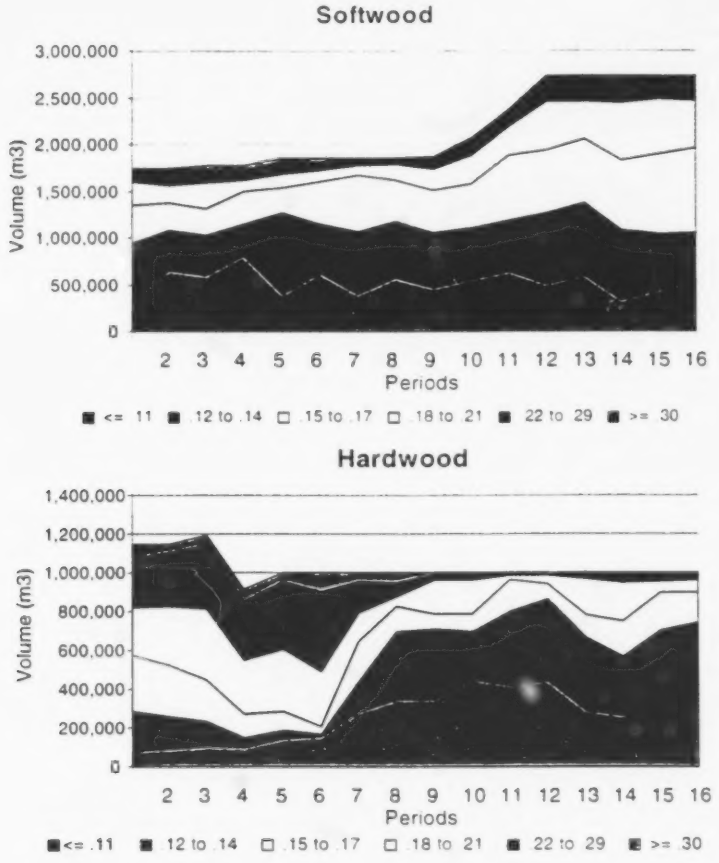


Figure 13. Piece size (m^3/tree) of softwood and hardwood over time.

There will be a noticeable transition to harvesting smaller softwood trees beginning in year 2007. This shift is a direct result of harvesting from managed stands, mostly in the form of commercial thinning. While the move to harvesting smaller managed wood is significant, it is not dramatic and can be readily coordinated and managed. The expected softwood product yield forecasts (Figure14) demonstrate that the yield of pulpwood grade material will increase slightly in the short term, however the yield of log grade wood is not expected to substantially reduce.

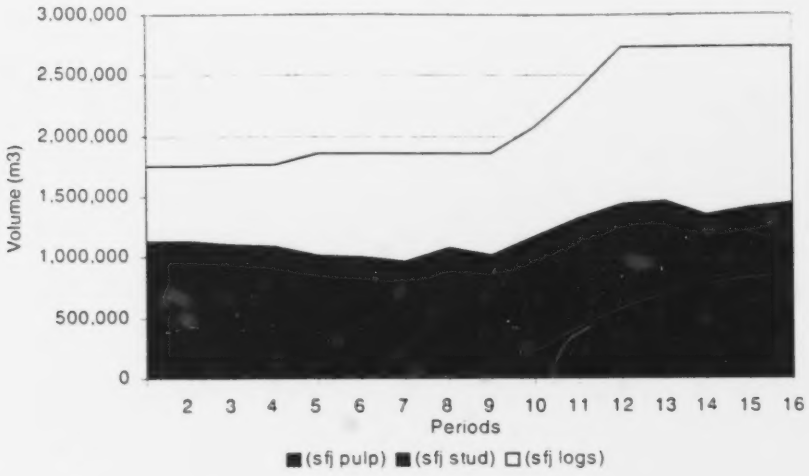


Figure 14. Product yield over time for Softwood on the Fundy License.

The shift to a smaller softwood harvested piece size was discussed at the proposal stage with our Sub-Licensees. There was certainly no strong commitment from that group regarding the option to reduce the softwood harvest levels, in order to increase the future harvested piece size and large diameter saw log yields. The issue of an AAC reduction from the License was also reviewed by, and discussed with DNRE staff. We received direction from DNRE senior management that our Management Plan should attempt to maintain the 1997 AAC level, and accept the resulting decrease in harvested piece size.

There is no significant change in the harvested hardwood piece size over the next 25-years of our Management Plan. After year 2032, however, there is a significant shift away from harvesting very large diameter harvested trees. This is not surprising given that at that time the major proportion of the hardwood AAC will come from operations in much younger managed stands, particularly previously pre-commercial thinnings. Figure13 clearly shows this forecasted trend.

We have not graphed the expected product yields from the hardwood AAC because historically, very low yields of hardwood veneer (less than 2% of total harvest) and premium hardwood saw logs (less than 3% of total harvest) have been delivered from the License. Through achievement of the silviculture objectives for hardwood management, these high-grade product yields should increase significantly in the long term. There are other opportunities to increase the high-grade yield from the Fundy License, involving acceptance of smaller diameter saw logs. There is also potential to provide increased volumes of "pallet grade" hardwood from the Fundy License.

Harvest Prescriptions

As previously noted, approximately 60% of the Period 1 harvested area will be done using clear-cut prescriptions. This level drops to less than 45% by 2007 and further reduces to less than 40% after 2017. This reduction is largely due to a shift to harvesting higher yielding managed stands, as well as the transition to commercial thinning prescriptions.

A summary highlighting the average sizes and size class distribution of clear-cut harvest prescriptions is provided in Table 39. The trends in harvest area size are well explained considering the shift to harvesting managed stands. The information summarized in Table 39 provides clear evidence that DNRE's policy to maintain clear-cut openings to less than 100 hectares in size is being well respected in the Fundy License Management Plan.

Table 39. Average area distribution of clear-cuts proposed over the next 25-years on the Fundy License.

Period	Average Clear-cut Size (ha)	Percent of area clear cut by Area size Class							
		< 10 ha	10-20 ha	20-30 ha	30-50 ha	50-70 ha	70-100 ha	100-110 ha	> 110 ha
1 2002-2006	24	7%	13%	15%	31%	31%	2%	0%	0%
2 2006-2011	27	4%	12%	18%	34%	31%	1%	1%	0%
3 2011-2016	31	3%	7%	14%	35%	35%	5%	0%	0%
4 2016-2021	31	3%	8%	13%	35%	33%	5%	0%	1%
5 2021-2026	33	3%	7%	6%	34%	48%	3%	0%	0%
25 - Year Average	29	5%	10%	14%	33%	34%	3%	0%	0%

In addition, and as part of the clear-cut opening policy; DNRE established guidelines regarding "adjacency". This policy indicated that clear-cut openings would be considered "adjacent" if the buffer between them was less than 200 meters in width, and the regeneration was less than 2 meters in height (or less than 10-years old). Clear-cut openings that shared a boundary of less than 50 meters in length would not be considered adjacent. As part of our harvest blocking efforts we have analyzed and adjusted our harvesting blocks to ensure that our Management Plan for the Fundy License respects the adjacency policy. The "Stanley" blocking and analysis software was indispensable in carrying out this analysis and ensuring that our blocking was consistent with this objective.

Forest Communities

This Management Plan has integrated the softwood, hardwood, White Pine, and Cedar forest communities into a single integrated management strategy for the Fundy License. We have not recognized any distinct softwood, hardwood, White Pine or Cedar harvest blocks in this Management Plan. We have, however, developed very specific prescriptions to be utilized in different forest communities. The prescriptions and their eligibility for use has been outlined in previous sections, and appendices of this Management Plan.

Spruce/Fir/Jack Pine

More than 94% of the spruce/fir/Jack Pine AAC is derived from the General Forest Zone of the Fundy License. While initially, none of the AAC comes from intensively managed stands; previously planted or pre-commercially thinned areas begin to provide harvest volume in 2007. By year 2021, more than 60% of the planned spruce/fir/Jack Pine volume is derived from these intensively managed stands. Commercial thinning is a significant portion of the harvest under this Management Plan, going from 0% of the harvest area in 2002 to a high of 28% of the harvest area by year 2017.

Hardwood

More than 95% of the hardwood harvest comes from the General Forest Zone in the Management Plan. Over the next 10-years, more than 13% of the harvest comes from hardwood silvicultural treatments (single-tree and group selection prescriptions) in predominately hardwood stands with potential for long term provision of high-grade (saw logs and veneers). In the long term (30-years from now) however, a greater and greater portion of the hardwood AAC will come from intensively managed stands, mostly pre-commercially thinned areas.

White Pine

Almost 92% of the white pine harvest comes from the General Forest Zone. More than 90% of the White Pine harvest would be considered "fallout" from "traditional" spruce/fir harvest prescriptions. We have however developed strategies focussed on improving the long term yield and quality of White Pine harvested from the License. These include:

- White Pine shelterwood harvest prescriptions,
- favoring White Pine natural regeneration,
- White Pine focussed pre-commercial thinning,
- White Pine planting and inter planting,
- under planting White Pine, and
- pruning.

We have modified and adjusted the above noted prescriptions in order to favor White Pine in the long term. These strategies and treatments have been reviewed and approved by DNRE staff. White Pine prescriptions will be designated for, and utilized in appropriate stands that have the potential for improved White Pine yields. Over the next 15-years, approximately 10% of the harvest volume will be derived from these prescriptions, however in the long term, more than 30% of the White Pine harvest will come from special White Pine management areas.

Cedar

More than 93% of the Cedar harvest is scheduled to "fallout" from the General Forest Zone. Only a very small portion of the cedar AAC is scheduled to come from the Cedar forest community. This is not surprising, because most of the Cedar stands on the Fundy License are presently located in constrained forest zones (DWAMUs and OSFH); where harvesting is not the primary management objective.

Biological Diversity and Community Level Objectives

As previously noted, DNRE also established biodiversity and forest community level objectives for each eco-region on the Fundy License. In reviewing these objectives, several of the communities are not sufficiently represented on the license at the present time. Those under-represented forest communities are noted in Table 40. In light of the fact that these 3 communities are not presently discernable on the Fundy License based upon the broad forest stratification utilized, we feel that DNRE should review and revise their forest community objectives.

Table 40. Forest communities on the Fundy License that are presently represented below DNRE objective levels.

Forest Community/Eco-Region	Present 1999 Level Hectares	DNRE objective levels Hectares
THSW - Eco-region 4	57	450
THSW - Eco-region 6	0	1,740
THSW - Eco-region 7	0	1,350

We have modified and adjusted our harvest plans in our proposed strategy to ensure that the established biodiversity and community level objectives are respected. A detailed summary of these objectives, and the levels maintained according to our proposed strategy is summarized in Table 41. It should also be noted, that while 3 communities types are under represented according to the broad forest stratification utilized, we will take action to maintain these under represented communities when they are encountered and identified on the ground. Specifically, any stands identified on the ground that meet under represented community type criteria will be designated and maintained until the point that the community level thresholds have been successfully achieved.

Table 41. Biodiversity and Community Level Objectives for the Fundy License for the 2002-2026 Management Plan Period.

Forest Community and Eco-region	Target	Present Level	Period															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
THP Reg3	2,275	2476	2575	2599	2926	2285	2992	3500	2804	2555	2713	2902	2918	2925	2917	2916	2920	2904
THP Reg5	945	2656	2726	3203	2506	2202	2370	2091	1653	1596	1607	1597	1566	1533	1525	1500	1441	1402
THP Reg7	60	938	1003	1108	1110	729	685	661	605	572	567	563	565	563	559	548	546	544
thsw reg3	1,445	3673	3300	2663	2538	2162	2356	2167	1882	1905	1989	1959	1951	1959	1961	1944	1942	1916
thsw reg4	450	57	57	58	57	57	57	57	56	62	60	58	57	57	59	71	107	160
thsw reg5	1,955	3892	3692	3928	3794	3375	3953	4203	3541	3200	3216	3199	3207	3157	3218	3188	3228	3174
thsw reg6	1,740	0	0	0	2	2	2	2	2	4	4	5	5	11	12	19	25	64
thsw reg7	1,350	0	0	8	8	8	7	7	7	8	8	9	9	9	16	26	42	74
SP Reg3	2,380	4905	4804	4804	4454	4390	4690	4712	5032	5160	5204	5400	5428	5524	5678	5697	5696	5531
SP Reg4	2,800	6067	7080	7820	8730	9718	10268	10922	11134	11129	11122	11153	11253	11592	11608	11442	11114	10980
SP Reg5	6,000	19939	19756	19367	18280	18145	18134	18852	18982	18997	19306	19855	19993	19906	19596	19231	18988	18319
SP Reg6	3,110	7170	6333	5750	5288	4755	4294	4103	4050	4107	4214	4221	4314	4295	4269	4162	3585	3592
SP Reg7	2,160	2175	2174	2245	2255	2256	2260	2482	2487	2798	2924	3097	3258	3452	3476	3566	3437	3363
bs Reg5	1,540	7982	7556	6997	6727	6505	6412	6438	7165	7307	7444	7797	7689	7701	7644	7539	6729	6519
bs Reg6	5,590	14504	12424	12470	12154	12235	12654	12916	13158	13572	14408	15863	16394	16669	16553	16021	15374	13927
bs Reg7	1,660	9103	8876	8616	8329	8783	8480	8701	8992	9061	9069	9546	9301	9484	9626	8926	8712	7896
pi Reg5	240	678	1038	1150	1091	699	791	862	857	849	844	842	767	770	683	684	584	645
pi Reg6	230	232	383	393	392	360	267	264	263	263	263	263	262	270	273	338	373	319
pi Reg7	180	255	190	181	185	218	215	255	255	255	255	262	271	344	350	476	477	407
jp Reg6	1,130	2996	2363	2525	2488	2076	2242	2086	2295	2741	2833	2824	2843	2822	2817	2810	2633	2554
ohwh Reg3	340	7215	6732	6072	6288	5249	6134	6349	5171	5005	5113	5312	5334	5352	5310	5529	6077	6102
ohwh Reg4	250	3986	3970	4046	4006	4235	4362	4316	4256	4350	4359	4334	4259	3967	3631	3116	3525	3718
ohwh Reg5	850	18444	17488	17725	15584	13870	12768	10763	9139	8648	8621	8518	8665	8691	8207	8084	9906	9837
ohwh Reg7	690	10975	10472	10056	8495	7412	6153	5385	4885	4699	4487	4493	4504	4452	4284	3997	4643	5254
osfh Reg3	2,320	6619	6569	6693	6193	6433	7077	7071	7449	7697	7783	8052	8081	8332	8520	8260	8029	7599
osfh Reg4	2,220	9260	10374	11591	12663	13703	14359	15115	15585	15791	16095	16280	16455	16602	16877	16432	16426	16044
osfh Reg5	5,820	28864	28107	27133	25824	25481	26127	27207	28052	29120	29705	30771	30931	30787	31063	29950	28844	27625
osfh Reg6	6,960	26316	22765	22420	20739	19899	20000	20379	21102	22460	23458	25292	25875	27059	25188	23381	22073	21124
osfh Reg7	3,040	15880	14958	14227	13385	13979	14097	14937	15615	16520	17033	17733	17563	18143	18010	17115	16219	14752
omwh Reg3	920	5100	4347	3641	3392	3140	3401	3279	3409	3630	3596	3578	3514	3558	3580	3604	3860	3670
omwh Reg4	480	3374	3464	4102	4282	4672	4971	5176	5288	5483	5667	5646	5638	5611	5486	5608	6053	6212
omwh Reg5	2,010	9720	8726	8248	7039	6571	6189	5193	5234	5280	5630	5843	5977	6508	6510	6640	8232	8367
omwh Reg6	2,290	11610	10305	9912	7963	7010	6447	5842	5731	5522	5557	5925	6376	6929	7189	7113	8482	8522
omwh Reg7	1,280	10714	9602	8756	7764	7300	7104	6981	7069	7309	7286	7331	7276	7255	6981	6875	7271	7185
lmwh Reg3	180	615	612	609	567	545	576	437	284	265	302	302	310	304	304	300	299	294
lmwh Reg4	90	819	1100	1828	1763	1796	1771	2010	2045	2103	2096	2254	2174	2191	2172	2160	2128	2093
lmwh Reg5	390	2588	2297	2456	1925	1846	1622	1395	1409	1477	1555	1642	1986	2005	1884	1771	1755	1712
lmwh Reg6	460	2350	2346	2326	2272	2026	2111	1920	1366	1410	1399	1486	1446	1377	1438	1346	1672	1656
lmwh Reg7	250	2349	2439	2581	2289	1750	1817	1740	1513	1555	1659	1767	1888	1878	1774	1798	1800	1650

Growing Stock

The growing stock trends of the major species groups, are very healthy under our management strategy for the Fundy License. The graphs shown in Figure 15 forecast these trends. The spruce/fir/Jack Pine growing stock levels are especially noteworthy, because we are now past the low point, with a steady and dramatic increase shown over the next 40-years. This is clear evidence of the benefits and "payback" from the intensive silviculture treatments (planting and pre-commercial thinning) on the land base over the past 20-years.

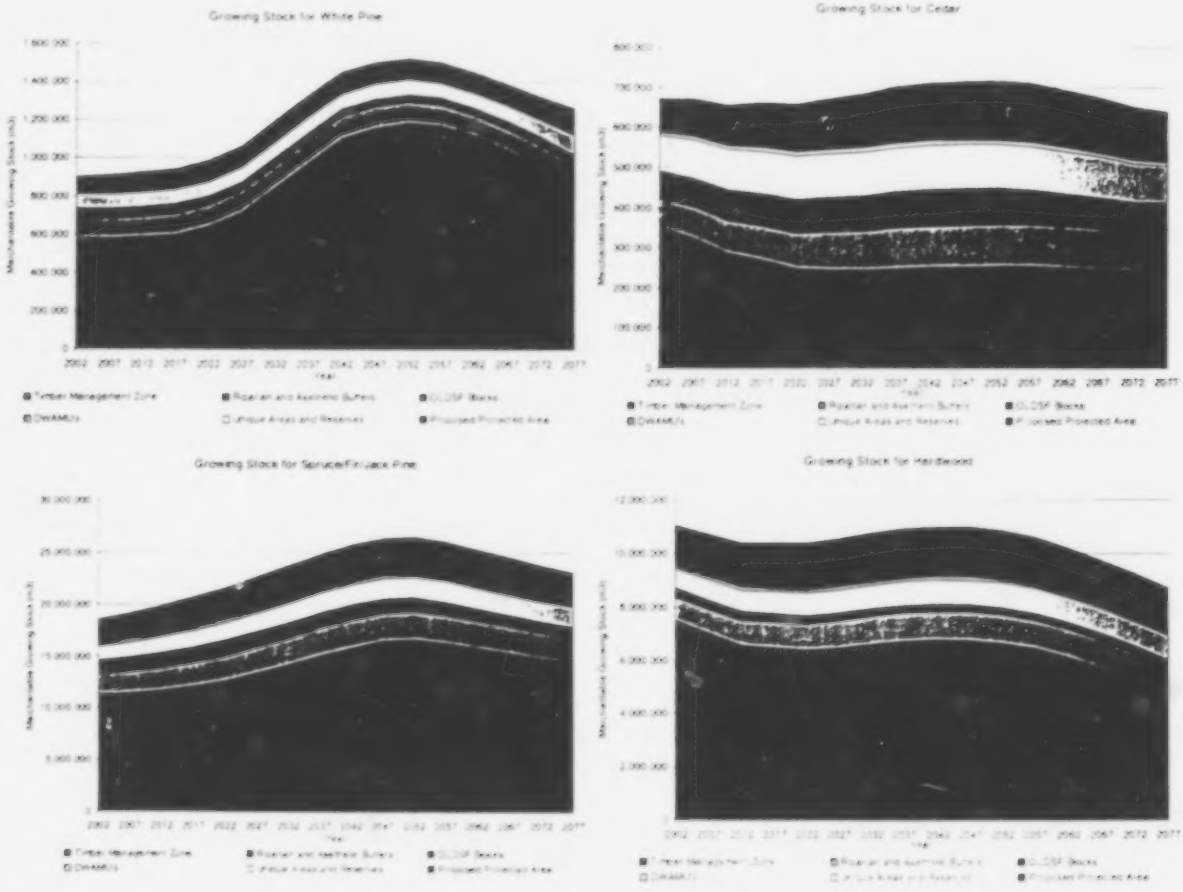


Figure 15. Total Merchantable Growing Stock of Spruce/Fir/Jack Pine, White Pine, Hardwood, and Cedar over time on the Fundy License.

The Wood and Habitat Supply Analysis

A digital copy of our wood and habitat supply model and analyses is available for DNRE's review. More details in this regard are included in Appendix XV.

Harvest Blocks

Harvesting within the General Forest Zone has been specifically blocked by location, prescription and scheduled 5-year operating period. A series of 1:125,000, 1:50,000 and 1:25,000 map products have been produced that clearly shows this information (Appendix XVI). In addition, a detailed block summary has been compiled, detailing the areas and species volumes by 5-year period, over the 25-years of this Fundy License Management Plan. The information is presented in Appendix XVII.

DISCUSSION AND RECOMMENDATIONS

We believe this Management Plan for the Fundy License meets the New Brunswick Department of Natural Resources and Energy's goals and objectives for Crown land management. We are comfortable that our strategy is responsible and achievable from environmental, economic, and social aspects. There are, however, several important issues that bear reiteration and further discussion...

AAC Levels

As previously noted, this 2002-2026 Fundy License Management Plan has increased the spruce/fir/Jack Pine AAC 2% above the 1997 Plan levels. The hardwood AAC is up by more than 25% compared to previous levels. The white pine saw log AAC has decreased by 2% from the 1997 Plan. Cedar saw material fallout over the next 25-years, is down by more than 24% compared to the earlier plan; however, it is important to note that this "fallout" level is not sustainable in the longer term. A long term cedar saw material AAC of 2,500 m^3/year would be more aptly considered the sustainable level.

As a result of the investment in silviculture, there is a great opportunity to significantly step up the spruce/fir/Jack Pine AAC in the long term. Our analyses indicate that it will be possible to increase the present spruce/fir/Jack Pine AAC by approximately 20% after 2050. With a stronger commitment by DNRE to tree planting, it would be possible to double the wood supply from the Fundy License by year 2040.

The hardwood management strategy outlined in this Fundy License Plan reflects harvesting approximately 207,800 m^3/year for the next 15-years, then reducing to a long term AAC level of 175,000 m^3/year. We consider this short term accelerated hardwood harvest to be a reasonable and responsible strategy because it allows us to do important hardwood silvicultural prescriptions, and avoid excessive use of partial removal harvest prescriptions.

Harvest Piece Size Trends

This Management Plan covers a time period when there will be a significant transition to harvest operations in managed stands (from 0% of the harvest volume in 2002 to more than 50% by 2022). Not surprisingly, this transition will result in a downward shift in harvested piece size. Specifically, there will be a reduced flow of large diameter saw logs while the vast majority of the harvest volume is smaller diameter stud wood. It is important to note that neither DNRE senior management nor Sub-Licensees favored reducing the harvest level from the License in order to provide a (slightly) larger harvested piece size. It is also important to note that we feel that this transition to smaller wood can be managed and coordinated. The expected harvest piece size and product yield trends have been demonstrated (Figures 13 and 14) and discussed in this Management Plan document.

Commercial Thinning

Commercial Thinning is both an important harvest prescription and an important silviculture treatment. It is fundamental to our management strategy on the Fundy License. From a wood cost perspective, it is necessary to recognize that commercial thinning operations are dramatically more expensive than all other harvest prescriptions. This is not surprising, considering the lower productivity and smaller harvested piece size of these operations. It is also important to note that wood from commercial thinnings is generally considered inferior by the sawmill and pulp or paper industries due to the larger ring size, and the higher proportion of juvenile wood. Within this Management Plan, we do not have any commercial thinning scheduled until Period 2, which begins in 2007. However, it is our intention to carefully review on-the-ground opportunities to do commercial thinning prescriptions in stands that may be ready. We may therefore seek to bring some Period 2 commercial thinnings into the latter years of this first Management Plan period. We would appreciate DNRE's support and cooperation in this regard, as it will be important to develop a commercial thinning workforce in time to treat more than 8,000 hectares of thinning that is prescribed in Period 2.

Recommendation: We recommend that DNRE consider recognizing commercial thinning prescription costs, and silvicultural benefits; by providing a per hectare silvicultural reimbursement, or by providing a reduced royalty charge for commercial thinning.

Silvicultural Treatments:

Our intensive silviculture program is the foundation necessary to realize the increased growth, and derive the planned harvest levels from the Fundy License. The required and planned tree planting and pre-commercial thinning treatments are down by 11% in this Management Plan compared to the 1997 levels. This reduction is largely a result of the decreasing area requiring treatment, which is a tribute to the aggressive silviculture program that has taken place on the License over the past 20 years. Nonetheless, the planned silviculture program must be implemented in order for the indicated harvest levels to be sustainable and available in the long term.

While planting and pre-commercial thinning are the noted activities with prescribed levels; it needs to be recognized that other inter-related programs must also be undertaken. Some of these activities include:

- Commitment to continue to invest in a Tree Improvement Program.
- Commitment to continue to supply the seedlings necessary for the planned tree planting program.
- Commitment to support site preparation treatments prior to tree planting.
- Commitment to undertake the required competition control program in planted or naturally regenerated areas, in order to maintain future crop trees free to grow.
- Commitment to support intensive silviculture programs specifically focussed on white pine.

We have noted these programs and necessary commitments because we are having difficulty procuring sufficient trees for our planting program, and getting the necessary competition control treatments approved.

Recommendation: We recommend that DNRE ensure they are committed to provide funding for the total silviculture program prescribed in this Management Plan, including providing sufficient seedlings, and providing funding and approval to maintain all (past and present) planted areas free to grow.

Protected Areas

As previously discussed, more than 10% of the Fundy License s part of the proposed "Protected Areas". The impact of this loss to the "working forest" is a reduction of more than 33,000 m^3/year of available harvest. Some mitigation of this loss for the Fundy Licensee and Sub Licensees is necessary.

Recommendation: We recommend that DNRE mitigate the loss to the working forest caused by the establishment of 41,270 hectares of "Protected Areas" on the Fundy License; by incorporating unallocated adjacent Crown lands into the Fundy License.

Adjacent Crown Lands:

Over the past 20 years, DNRE has purchased two large tracts of forestland. These include the former Pejepscot lands in southeastern New Brunswick, and the former Georgia Pacific lands in southwestern New Brunswick. It has also recently come to our attention that there are significant areas of unallocated Crown owned forestland, particularly southeastern New Brunswick. In total, we believe that there is more than 150,000 hectares of unallocated Crown forest in the province. Some of this land is directly adjacent to the Fundy License.

Recommendation: We recommend that DNRE review the status of the unallocated Crown forestland in the province, and incorporate these areas into the adjacent Crown Licenses.

Deer Wintering Area Management

The province of New Brunswick has developed a credible and science-based approach to management and long term maintenance of recognized deer wintering habitat management. We are, however, concerned that DNRE needs to further review its interpretation, criteria, and management objectives related to "Moderate Winter Deer Habitat". We feel that the criteria and objectives related to moderate winter deer habitat are overly and unnecessarily restrictive.

Recommendation: We recommend that DNRE staff review and revise the definition of, criteria for, and management objectives related to "moderate winter deer habitat" within DWAMUs.

We are also concerned about the very small (less than 100 hectares in size) deer wintering areas (and DWAMUs) designated on the Fundy License. It is not realistic or practical to do detailed DWAMU Management Plans, under the present DNRE requirements, for such small areas. We feel that DNRE should develop alternative management plan requirements specifically for very small DWAMUs.

Recommendation: We recommend that DNRE staff, in consultation with Licensees, develop alternative streamlined management plan requirements for very small (less than 100 hectares in size) DWAMUs.

Old Spruce/Fir Habitat (OSFH) Blocks

Based upon the previous MCFH objectives from previous Management Plans, DNRE has established new criteria for OSFH blocks. While we support the need for specific management objectives related to old spruce/fir habitat, we have some major concerns related to the OSFH block objectives. These include:

- The habitat windows assigned to managed stands.
- The present OSFH block size objectives based upon the Marten are not supported by local scientific research.
- The Eco-region based OSFH block objectives are not plausible or realistic.
- The OSFH block objectives should re reviewed in light of the establishment of large Protected Areas in the province and specifically on the Fundy License.

We are also concerned about the OSFH block objectives as we transition to subsequent Management Plans. New OSFH blocks are selected and designated at least one year (and sometimes two years) prior to a new Management Plan taking affect. It has been our experience that large areas of the "General Forest Zone" are unnecessarily constrained in this exercise.

Recommendation: We recommend that DNRE staff, in consultation with Licensees, review and revise the OSFH block criteria and objectives, well in advance of preparation of the 2007 Management Plans.

Forest Community Objectives

A new requirement for the 2002 Management Plans was the establishment of additional wildlife habitat objectives. These objectives were related to old and late succession stages for all major forest communities. Objectives were established for each major forest community type in each Eco-region. Unfortunately these objectives were set without having looked at the present levels, and distribution of these habitats. Several community types (THSW in Eco-regions 4, 6 & 7) are not present on the License at the

target objective level. In these situations, we have taken steps not to further compromise these habitats. Specific stands that we encounter and identify on the ground meeting these under represented community criteria, will be designated and maintained until the point that the threshold levels have been successfully achieved.

Recommendation: We recommend that DNRE review the updated forest inventory and establish more realistic and achievable forest community level objectives for the Fundy License.

Harvesting in Non-Timber Zones

Within this Management Plan, a strategy is specifically proposed for each of the non-timber zones on the Fundy License. The strategies include a specified level of active management and harvesting within each forest zone. It is important that DNRE staff (Branch, Region and District) review these plans and are accepting of, and approve the levels of activity; particularly the harvesting within non-timber primary objective zones. It is also important to recognize that harvest operations must be economically viable and logistically possible. Some road construction within these non-timber zones will be necessary. Operationally practical levels of removal will need to be accepted and approved.

Recommendation: We recommend that all levels of DNRE (Branch, Region and District) have the opportunity to review and comment on this Management Plan, prior to its approval by DNRE senior management.

Incorporating New Objectives:

Many DNRE policies and objectives are unfortunately established as constraints. Examples in this regard include the proposed Protected Areas, the tolerant hardwood policy, and the new forest community objectives. As such, there is a constant eroding of the "working forest" land base. We request that new policies and objectives be developed jointly by DNRE in consultation with Licensees and Sub-Licensees. We believe that this approach would lead to more consensus and buy in than the win/lose conflict that often presently occurs. We feel very strongly that DNRE should adopt a policy that states: "All land use decisions or objectives must not further compromise the present or long term harvest level from New Brunswick's Crown land." We believe that such a policy would stimulate all stakeholders to reach compromises and consensus on important resource issues.

Recommendation: We recommend that the government of New Brunswick adopt a policy that "All land use decisions and Crown land Management objectives must not further compromise the present or long term harvest level from New Brunswick's Crown land."

Doubling the Wood Supply:

In order to realize the full economic potential of New Brunswick's Crown Land, we feel that it is necessary to have explicit wood supply objectives. Since 1982 there have been numerous discussions between industry representatives and senior DNRE staff regarding adopting an objective: "To double the wood supply within 40 years". This goal is readily achievable and compared to other benchmark jurisdictions it is somewhat conservative. Such an objective could serve as the foundation to stimulate future investment in the provinces mills and communities. If DNRE were to adopt an objective to double the long term wood supply, we could readily develop a new management plan for the Fundy License to realize this objective by 2040. Some additional tree planting and minor adjustments to "DNRE's Acceptable Natural Regeneration" and plantation establishment policies would be necessary to achieve this objective on the Fundy License.

Recommendation: We recommend that the government of New Brunswick establish Crown License management objectives and related performance criteria focussed on doubling the sustainable harvest by 2040.

CONCLUSION

Over the past two years we have submitted evolving drafts of our proposed 2002-2026 Management Strategy and plans for the Fundy License to DNRE for review. We have carefully considered the comments received, and we have revised our strategy and proposed Management Plan accordingly.

We believe that this blocked 25-Year Management Plan for the Fundy License meets the New Brunswick Department of Natural Resources and Energy's goals and objectives for the Crown Land Management. We are confident that we can implement this strategy on the ground consistent with DNRE's present policies and procedures.

We are proud of this Management Plan and we feel that it is environmentally, economically, and socially responsible.

J.D. Irving, Limited
January 21, 2002

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